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PHILOSOPHY.

In the school of life many branches of knowledge are taught. But the only philosophy that amounts to anything at all is just the secret of making friends with our luck.—Henry VanDyke.

The Home Rule Agitation.

In the last few weeks the Illinois legislature considered a home rule bill which was favored by Chicago interests and also by the larger cities of the state. The principal provision of the bill was the placing of public utilites under the supervision of the local governments, in addition to the supervision of the state utilities commission. After the bill was thoroughly discussed and one form of it accepted by the Senate, the House voted against it so that the measure failed to become a law.

Illinois is not the only state in which home rule of public utilities has been agitated. Many of the Western states have had the matter up for discussion. The principal power which it is desired to obtain for the cities under home rule is that of rate-making. The argument advanced to favor this point of view is that the city itself is the best judge of what is a fair and reasonable rate. In other words, that the self-interested buyer of service sets the price which he is to pay for service rendered.

In a recent address before the National Electric Light Association, John H. Roemer, former chairman of the Wisconsin Railroad Commission, discussed the question of municipal regulation of public utilities or "home rule" as contrasted with state regulation of utilities by commissions. It was pointed out that public utilities, in early days, were largely local in character, while now they have broadened so as to be interurban and suburban as well as purely urban. This broadening out can be seen in electric railway systems, telephone systems, electric light and power systems, and even in the operations of gas companies.

Advocates of municipal home rule of utilities overlook the fact that the powers of municipalities seldom extend beyond their limits, unless by special legislative enactment such additional power is conferred. As utility service which includes a number of communities, will doubtless become more and more the practice, Mr. Roemer stated, it is of increasing importance to have the regulation of this service not by the individual towns served but by the state at large, so that the regulation will be uniform and consistent in every community. Separate regulation in each town is bound to result in much injustice and involves many difficulties which are eliminated by the uniform practice established by the state commissions.

Chicago Market Week.

All telephone men who are planning to visit Chicago during the great "Chicago Market Week"—August 2-7—for which the city is arranging, are cordially invited to make Telephony's offices their headquarters. Both the business men and the officials of Chicago are striving to attract a vast number of people to the city during the first week in August, and no pains will be spared to give the visitors a profitable and pleasant time.

It is inevitable that there will be many telephone men among these visitors, and Telephony hopes they will all feel at liberty to make use of its offices and know that the latch string is always outside. If convenient, have your mail and telegrams sent here, and consider it "telephone headquarters."

Chicago is a fine summer resort, as well as always a good market, and the Association of Commerce, which is promoting the occasion, is making extensive plans to see that visitors are royally entertained during the first week in August.

There will be hydroplane and aviation spectacles, aquatic sports, lake excursions, motor races and special events at all places of amusement. In addition to the recreation program, the business men will offer unusually interesting displays to the out-of-town buyers. In short, August 2-7 will be a good week to spend in Chicago as a part of your vacation. The city will welcome you all, and in that welcome Telephony joins heartily.

To a Young Man Looking for a Pull

By HERBERT KAUFMAN

Influence is a crutch. Sound men neither need it nor heed it. They're strong enough to stand alone and on their records. A rich man can only support an incapable son. He can't sustain him where his own efficiency won't retain him.

There are never enough first class performers for the needs of the universe, but there's always an over-supply of misfits and second raters.

The world is on a ceaseless hunt for bigger and braver and brighter personalities. If you're endowed with compelling attribute, you can't dodge recognition. But if you're puffed and swollen with vanity, we're bound to get your real weight when you do step on the scales of comparison.

Incompetents are generally egotists and likely to superestimate their attainments. They so far exaggerate the worth of their work that the unbiased valuation of the market is bound to seem unjust. The most insufferable being under the stars is a failure with the delusion that society is engaged in a general conspiracy to defraud him of recognition.

Dauber whines for intercession with an art director, and thereby brands himself as an illustrator whose pictures have already been rejected on their own merits. Dr. Bluff complains that "all the first class practice of the town is controlled by cliques," and immediately establishes himself as a physician whose conceit binds him to the realization of his shortcomings.

Idler prefers to believe that his associates have gained promotion because of a "drag" with the boss, rather than face the truth that he is slipshod and lazy and unambitious.

You can get anywhere and anything if you're right and bright. You can be as much and have as much as your ideas can demand and your facilities can command.

There's always a chance for those who know themselves, but the idiot who considers the desire to have, synonymous with the strength to hold, is hopeless.

Intervention is unnecessary for the able and wasted upon the inept. You can lead a fool to opportunity, but you can't make him think.

So long as miners become cabinet officers, so long as newsboys become senators, so long as foundlings become governors, so long as train boys become Edisons, so long as farmer boys become Marshall Fields, so long as 90 per cent. of the dominating personalities in law, in medicine, in commerce, in journalism, in finance, in politics, began life with a capital of hope and a heritage of faith, so long as the control of the country's affairs—industrial, professional and political—is held by poor men's sons, who asked no more than an honest chance, and made their way and themselves by unflagging reliance in their own futures and an unwavering adherence to that confidence—whoever wheedles and fawns for more than a fair show, is a booby.

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Construction of a 44-Duct Subway Under Railroad Track

Description of the Building of a Subway Under Four Tracks of the New York Central Railroad in New York City Last Summer Published in The Telephone Review—Difficulties Encountered and How They Were Surmounted

By Clifford M. Hartley

An interesting subway, and one presenting more than ordinarily difficult construction features, was built last season, at Park avenue and 178th street, New York City, by the Empire City Subway Co., Ltd. This line extended from a manhole at the southwest corner of Washington avenue and 178th street, west through 178th street, to a manhole at the southeast corner of Park avenue. From this manhole it was carried under the track of the New York Central Railroad to one on the southwest corner, and from there west on 178th street to the vault of the new Tremont central office of the New York Telephone Co., located at the southeast corner of Webster avenue and 178th street.

This building was recently enlarged, and a new switchboard installed, known as Fordham. The new subway was needed to provide a connecting link to the rear entrance of the central office, and will also serve to relieve the existing duct lines on Webster avenue, and to shorten the cables running east. It will, further, obviate the necessity of taking steps involving considerable expense to remedy conditions existing in the cable plant crossing the 177th street bridge, which is picking up a large amount of stray current from the trolley tracks.

This article will deal principally with the section crossing under the railroad property, the general plan and layout of which is shown in Fig. 1. This subway consists of 44 multiple clay ducts, the formation of the section under the tracks being six six-way and two four-way, laid as shown in Fig. 2.

The center line of the subway, as originally planned, was coincident with the south rail of a foot bridge over the tracks at this point. Before construction was started, when the line was laid out on the ground, it was found that such a location was impracticable for the following reason: In order to support the tracks during the construction of the subway beneath them, it would be necessary to drive piling, and the pile driver could not be operated so close to the foot bridge. The line under the tracks was, therefore, shifted seven feet south, though the location of the manholes remained the same, thus making necessary a slight reversed curve in the line where entering the manholes.

The railroad at this point is in a cut, the base of rail being about ten feet below the street level. It is a four-track, third-rail system. The banks of the cut on either side are supported by masonry retaining walls. This is the main line of the New York Central, and the traffic is very heavy, particularly during the morning and evening rush hours. There is an average of 265 trains per day passing this point, and by reason of this great volume of traffic it was necessary to do the pile driving at night.

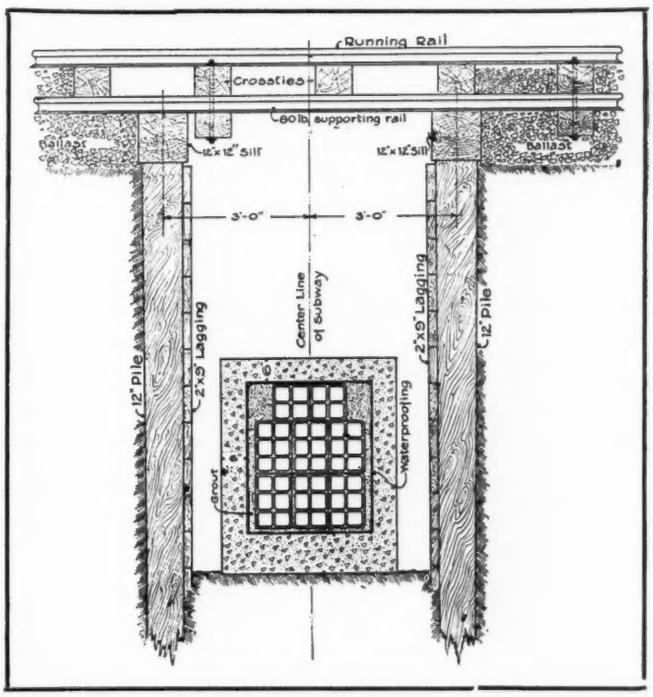


Fig. 2. Cross Sectional View Under the Tracks.

Each track was supported in the following manner: At a distance of three feet on either side of the center line of

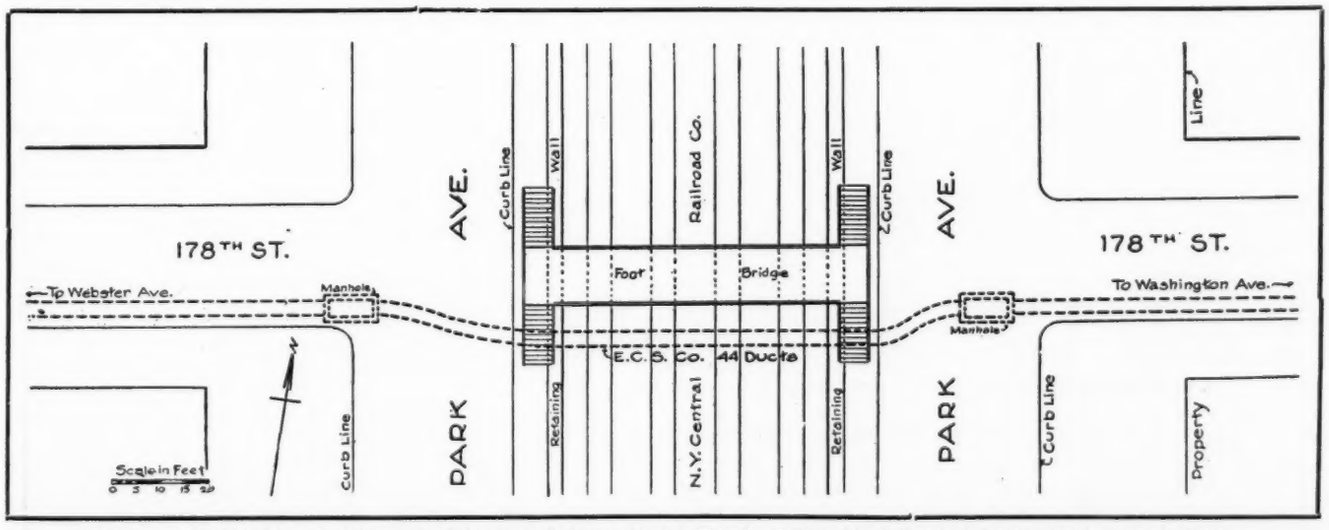


Fig. 1. General Plan and Layout of 44-Duct Subway Under Track of New York Central Railroad, New York City.

the subway, three piles were driven, one between the rails and one outside of each rail, making a total of six for each track, or 24 for the whole job. These piles were 25 feet long and 12 inches in diameter at the top. They were driven to a depth of 15 feet, cut off and capped, the diameter at the top being about 10 inches. On top of the piles was placed a 12 by 12-in. sill.

Each running rail was supported by seven 80-pound rails, 33 feet in length. These were placed directly under the ties, and parallel with the track, four upright and three upset, making a very tight and compact support. To make the construction still more rigid, these seven supporting rails were "shived" and bolted to the ties. They rested on the sills on either side of the excavation line, and the ends, which extended back of the piling a distance of 13 feet, were supported by mud sills, three on each side, as shown in Fig. 2.

The whole job was certainly involved in difficulties, the retaining walls being so close to the track that it was hard to find room to store materials. Further, it was necessary to take the pile driver a distance of 1.4 miles north, or 1.8 miles south, in order to switch it to another track at the approach of a train on the track upon which it was working.

Immediately upon the completion of this work, excavation of the two shafts was started, the shaft on the east side being opened first. This was carried down a distance of six feet by the usual method of shoveling out by hand. Then, instead of relaying the material by shoveling onto scaffolds, a tripod, carrying a Yale & Towne chain hoist was installed. With this hoist were used three iron buckets holding 1.4 cubic feet each. This arrangement, however, proved rather slow and expensive, the buckets coming to the surface at about three-minute intervals, which meant but one cubic yard of material per hour, provided a steady pace were maintained. The chain hoist was, therefore, discarded, and a hand winch installed. This proved more satisfactory, as the time of the operation was reduced by one minute, the operating force remaining the same.

The excavating material was a sandy loam. At a depth of 14 feet, water was encountered in considerable volume. The method of handling this water will be described later. The shaft execavation was all tight sheeted with 2-in. by 9-in. sheeting, in the usual manner, the ranges and braces being 6-in. by 8-in. stuff. After a 20-ft. depth had been reached in the shaft, the tunnel under the tracks was started. The shaft on the west side was excavated in a similar manner to the one just described, and the tunnel driven from both ends.

The tunnel was six feet high and five feet wide, and on the floor was laid a track, made of angle iron, on which were run small flat cars. The buckets were filled and placed on these cars, hauled to the shaft, and thence to the street. The cars were operated by ropes, the operation being controlled by means of whistles. This whole method proved most efficient.

A flow of water, which might have proved very troublesome, was handled in a manner that left nothing to be desired. A sump hole was dug in each shaft, and a drain composed of six-way multiple tile, embedded in broken stone, laid along the side of the tunnel. The water thus drained to the sumps was dumped out by two gasoline driven diaphragm trench pumps, one at each shaft. It was necessary to have four pumps on the job, as they were operated continuously night and day. This water was evidently an underground spring, as it was clear and very cold, and the flow, which amounted to approximately 100,000 gallons per day, was very constant.

An interesting feature of the work is the manner of shoring the retaining walls on either side of the tracks. It was the opinion of some that this was the "nicest" part of the whole job, from an engineering standpoint, such opinion being based on the fact that these are masonry walls, and consequently not at all self-supporting over such a span, as would be a concrete wall. We will take, for instance, the east wall, the base of which was about five feet below the base of the rail, and six feet thick. On the floor of the excavation, and perpendicular to the longitudinal axis of the wall were placed two 6-in. by 8-in. wall plates, six feet apart. Each of these supported four 6-in. by 8-in. struts, five feet long, across which, in turn, was placed a 6-in. by 8-in. cap. Between these caps and the bottom of the wall were six 6-in. by 8-in. beams, crosswise of the excavation. It may be well appreciated that the vibration caused by passing trains but five feet distant was considerable.

The banks of the tunnel under the tracks were taken care of by spiking 2-in. by 9-in. sheeting, or lagging, to the piling on either side of the trench. At this depth the excavation was in coarse sand, very easy to shovel, but, of course, requiring sheeting and bracing wherever exposed, even on the face of the heading. Progress at this stage was slow. Every possible precaution was taken, with very gratifying results.

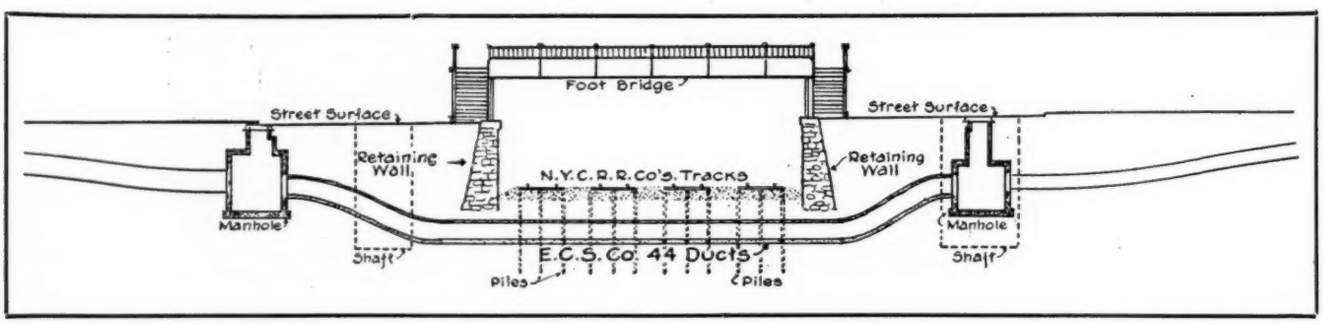


Fig. 3. Longitudinal Section of the Subway Under the Railroad Tracks in New York City.

Upon the completion of the excavation, a 1:2:4 concrete base, or floor, one foot thick, was laid, with side walls of 1:2:4 concrete six inches thick and four feet high. After the forms were removed, waterproofing of four-ply tar paper was applied to the floor and the inner faces of the side walls, with hot pitch. The tile was then laid on a one-inch mortar bed in the usual manner. The duct formation, envelope, etc., are shown in Fig. 2. The waterproofing was carried up over the top of the conduits, with a lap of six inches and the annular space between the tile and the concrete side walls was filled in with grout. A six-inch concrete slab was then placed on top of the tile and bonded to the side walls by a V-shaped key left in them for that purpose.

The laying of this tile was attended with difficulties, on account of the cramped quarters, and the fact that all materials had to be lowered down the manhole shafts, and carried back to the point where they were to be used. The section under the tracks was level, the floor of the tunnel excavation being 21 feet below the street grade. At either

end, after passing under the retaining walls, the ducts rise to enter the manholes. On the east side this rise amounts to 7.5 feet vertical in 25 feet horizontal, and on the west side to 9 feet vertical in 35 feet horizontal. On account of the fact that the line had at these two points, both a vertical and horizontal curve, it was necessary to use many short lengths of tile, or pieces of 12, 9 and 6 inches in length.

The two manholes were built of reinforced concrete, using 1:3:5 mixture, and the walls, chimneys and roofs were of standard design and section. The manhole at the southeast corner is 9 ft. by 4 ft. in plan with headroom of 8 ft. 4 in. and a total depth of 16 ft. 8 in. The one at the southwest corner is 9 ft. by 3 ft. 6 in. in plan with headroom of 10 ft. 4 in. and a total depth of 15 ft. 6 in. The construction of the forms for these manholes, the mixing and placing of the concrete, etc., involved nothing of particular interest. Most of the concrete was mixed in a small continuous batch machine mixer.

After removing the forms, the inside walls were rubbed down and finished, and the backfilling completed, such lumber as it was possible to draw being taken out. The track supports and sheeting under the tracks, were, of course, left in place. Great care was exercised in back filling and tamping, particularly under the tracks, and under the two retaining walls, in order thoroughly to insure against any future settlement.

Resistance and Inductance of Iron and Bimetallic Wire.

When a direct current flows in a wire, the distribution of the current is uniform over the cross-section of the conductor. When, however, an alternating current flows in a wire there is a tendency for the current to crowd to the outside. This phenomenon which is caused by differences in the opposition to the current flow in different parts of the conductor, becomes more pronounced the greater the number of alternations of the current in a given time and, in iron wires, the greater the current in the wire. In some cases the flow of current is confined almost entirely to a thin shell on the outside of the wire and hence arises the term "skin effect" for this phenomenon. The effective resistance of the conductor increases as the frequency of the alternations increases and at the same time the inductance, which depends upon the magnetic field, is diminished. This effect is not only of interest from a purely scientific standpoint, but is frequently of importance in engineering practice.

When the conductor is of simple form and the magnetic permeability of the material is known, the effective resistance and inductance can be calculated by formulas which have been developed. The investigation, the results of which have just been published by the Bureau of Standards, Department of Commerce, in scientific paper No. 252, was concerned with the skin effect in conductors containing iron. Two classes of conductors were considered in particular, the iron telegraph and telephone wires and copper clad bimetallic wires. The latter have a core of steel surrounded by a shell of copper.

The effective resistances and inductances of these conductors were determined experimentally for different strengths of current and for frequencies up to 3,000 alternations per second. The results for iron wires obtained with very small currents were compared with values computed by known formulas and the agreement is fairly satisfactory. Formulas are developed in this paper which permit a similar comparison between measured and computed values for the copper clad wires.

The paper concludes with wire tables computed by means of the new formulas. In these tables the effective resistances and inductances of copper clad wires are given for wires of different sizes and conductivities and for frequencies up to 3,000 alternations per second. Interested parties may secure copies of this pamphlet free of charge by applying to the Bureau of Standards, Washington, D. C.

How to Retain Desirable Employes.

"Satisfied employes are a company's best asset," said Miss Anna Porter, chief operator of the Central Union Telephone Co., at Muncie, Ind., in a recent talk before a convention of the chief operators of eastern Indiana. "The company realizes this and provides not only for our comfort, but for our pleasure. Those having employes in their charge have a responsibility. If they have persons doing exceptionally well, it is their duty to speak of it. Sometimes a word of encouragement is all that need be offered to save a willing worker from discouragement. Do not criticize harshly. Encourage employes to talk. They are sources of valuable information. Study peculiarities. Some can only be reached by kindness; others take advantage of it.

"In handling either type it is necessary to gain the respect and keep the confidence of your people. Work should be made as interesting and attractive as possible. When there is a resignation without sufficient reason, look about and you'll probably find the fault is in yourself, or that there is something that has been left undone. There is no royal road to the selection and retaining of desirable employes, but the watchful, thoughtful employer who makes the most of his past experiences, will not make many mistakes."

Growing Use of the Telephone as a Business Solicitor.

A certain solicitor for a grain dealers' publication spent a day or so in Louisville, Ky., recently calling on a number of members of the trade in an effort to sell advertising space. He was compelled to give the effort up as a bad job. "We do not advertise any more," was the invariable answer.

"But how do you get in touch with your trade; how do you sell and how do you buy?" the solicitor inquired.

One man pointed to a typewriter and a mimeographing outfit, as a part of his response, but he and all the rest leaned back in their swivel chairs, put one hand out to their right and the other to their left and with them patted their telephone instruments, those of the Central Home Telephone & Telegraph Co. and the Cumberland Telephone & Telegraph Co.

"We go anywhere we want with these," they said. "We can narrow down our inquiries to a list of those who are worth while bothering with, instead of having to worry with a lot of little fellows who haven't enough wheat to pay dealing with. If we advertised generally we would have to deal with a large number of them. The long distance telephone has done a great deal toward making the grain business what it is today."

Convention of Western Counties Association of Ontario.

The fifth annual convention of the Western Counties Telephone Association of Ontario was held June 18 in the council chambers at London, Ont., Can. While the attendance was not very large, many interesting addresses were given, which made quite an impression on those present.

Th officers were re-elected for the ensuing year, as follows: George Taylor, of Blenheim, president; Dr. D. Doan, of Harrietsville, secretary and treasurer. The visitors were entertained most royally by Mayor Stevenson of London and it was unanimously voted to hold all future meetings in London.

Convention of Indiana Independent Association.

At a meeting of the executive committee of the Indiana Independent Telephone Association, held at Indianapolis July 8, it was decided to hold the annual convention at the Claypool Hotel, Indianapolis, September 15 and 16.

"Telephony's" Home Study Course for Telephone Men

A Complete Presentation of the Principles Underlying Modern Telephony in All Its Branches—Arranged Systematically So That Regular Reading and Faithful Study Will Qualify Ambitious Men for Higher Positions—Prepared Under Supervision of Stanley R. Edwards—This Section Written by Jay G. Mitchell

Quiz Questions on the Preceding Installment.

The answer to these questions will be found in the reading section bearing the same number. Answers are not to be sent to TELEPHONY for criticism. For the benefit of those desiring the advantages of a correspondence course, the Engineering Extension Department of the Iowa State College has volunteered to answer questions and criticize replies to questions and solutions of the problems which will be presented from time to time in connection with the course. No charge will be made for this service and the offer applies to all subscribers of TELEPHONY regardless of whether they live in Iowa or elsewhere. Correspondence should be addressed to the Engineering Extension Department, Iowa State College, Ames, Iowa.

144. What are the three essentials of fuses?

145. What controls the point of operation of any given fuse?

146. Give some reasons of your own why the fuse should be positive in action and should destroy the arc formed when it is operated.

147. What effect does variable air temperature have on the operation of open fuses and why?

CHAPTER VII. The Magneto Line (Continued).

148. *The mica type of fuse.* In Fig. 60-*A* is shown in theory the form of mica fuse familiar to every telephone man. Let us for a moment consider the advantages and disadvantages of this type. Two metallic terminals, *A* and *B*, are provided, mounted on a strip of mica *D*. Between these terminals, and supported by the mica is the fuse wire *C*.

The advantages of this type of fuse are as follows: It is easily removable for replacement. The condition of the fuse can usually be determined by inspection. It is cheap and may be mounted compactly in a small space.

The disadvantages are as follows: It is rather short, and has no means provided for extinguishing an arc that is of sufficient strength to persist after the fuse has been operated.

Several manufacturers have introduced modifications for the purpose of rendering this type of fuse more nearly perfect. These are shown in principle in Fig. 60-*B*. In one type the fuse wire is threaded through a hole in the mica from side to side. It is claimed that the abrupt change in direction produced in the arc by this means will serve to extinguish it promptly. In another type the fuse wire is wound around the mica mounting as shown, and for the same purpose as in the first-mentioned type.

149. *The enclosed link fuse.* It is known that if the fuse wire is enclosed in a more or less air-tight space, the gases produced by the melting of the fusible element and the arc will have a tendency to stifle and extinguish the arc. It is partly for this reason that the familiar form of tubular enclosed form of fuse has become so popular. In Fig. 60-*C* is shown the theory of a link fuse in which this feature is used.

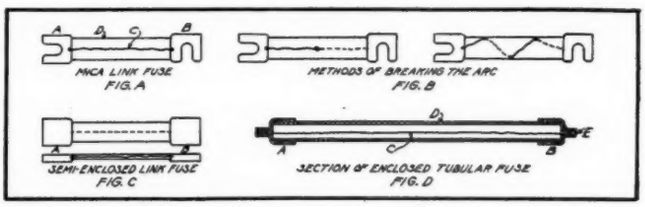


Fig. 60. Mica and Tubular Fuses.

The fuse wire is enclosed between two sheets of fiber and is connected to two metallic terminals, *A* and *B*, in the usual way. The theory is that the heat and gases produced by the melting of the fusible element have the effect of extinguishing any arc that may be formed. This fuse is ordinarily provided with straight terminals without any notches and is designed to slip between two springs on each end of its mounting.

While all these types of fuse are in wide use, they are all open to one criticism as far as their adoption for a general protective scheme is concerned. The distance between the terminals is hardly great enough to insure the fullest possible protection. In most cases where these fuses are used in modern telephone engineering, they are supplemented by other protective devices which to a great extent counter-balance their shortcomings.

150. *The enclosed tubular fuse.* The enclosed fuse for telephone protective apparatus is made in a variety of forms. The tubular type is sometimes called the pencil fuse. In almost every case, the different design used is for the purpose of adapting the standard type to some special mounting. The general design is shown in theory in Fig. 60-*D*. The fuse wire *C* is threaded through a tube *D* which may be made of wood, fiber or porcelain. In some makes, the fuse wire is surrounded in the tube with a packing of asbestos or some other non-inflammable substance, in others the enclosed air space is relied upon to smother the arc. Some types are open at the end of one of the terminals, as *E*, in order to provide an escape for the expanded air and gas; in others, the space between the outside of the tube and the inside of the terminals is considered sufficient for the vent.

In fuses of this type the terminals are placed farther apart than is the case with the mica link fuses and it is true that they are more reliable as to breaking the arc for that reason.

The enclosed feature also increases their power to extinguish an arc. In general use, fuses of this type, having a current carrying capacity of from five to seven amperes, have been found to be satisfactory. The student should note that it is *not* the intention to have these fuses operate because an abnormal current of five to seven amperes is passing through the circuit in which they have been connected. It is the intention that they shall not operate on momentary heavy currents of this value, but that other devices in the circuit, such as the carbon block arrester, shall operate and *increase* the current flowing through them to such a strength as will operate the fuse at once.

Some manufacturers use an alloy of lead for the fusible element, while others use copper clad iron wire, phosphor bronze wire and German silver wire. The object in each case is, of course, to secure an arrangement that will insure the maximum reliability possible to attain and that will therefore afford the greatest possible measure of protection.

151. *Development of heat in a conductor.* The operation of all forms of fuses and protective devices finally depends, as we have seen, upon the production of heat in any conductor carrying an electrical current. The amount of heat developed, under any given set of conditions, in a conductor was very carefully and accurately investigated by Joule and Lenz. The results may be stated in this way: A current of one ampere flowing through a resistance of one ohm develops therein 0.24 *calories* per second.

The reader will more readily remember this law if it is stated in this way: A current of one ampere flowing through a resistance of one ohm will produce sufficient heat in the circuit to raise the temperature of one gramme (about 1/30 of an ounce) of water 24/100 of a degree Centigrade in one second.

It should be very clear, therefore, that if the flow of current is continued in any circuit for a time, the heat will *accumulate* unless it is taken off by the surrounding air, or other body, as fast as it is created. If the *heat* is *not* dissipated as fast as it is produced, the temperature of the conductor will continue to rise, although the amount of current flowing may be very small and the production of heat very slow.

152. *Reasons for use of heat coils.* A flow of current which would not in the least injure the wire in the winding of a relay in ten minutes, might entirely destroy the insulation of the wire of the winding of the relay if it were allowed to continue for one hour. This heating effect would be due to the production of the heat *faster* than its dissipation by the relay frame and the surrounding air. Such a current would very likely be of low voltage and would have no effect on the carbon block arrester. It would also in all probability be so weak as to have no effect on the ordinary fuses inserted in the circuit. For this reason it is necessary to provide some other type of protection on telephone lines exposed to crosses with currents of this character. In the city districts these conditions are due to possible crosses with telegraph wires, high resistance crosses with low tension lighting systems, inductive currents from alternating current circuits and a number of other possibilities which will occur to every telephone man from his fund of personal experience.

In order to provide the necessary protection against currents of this character, which may be of great destructive power and which may not give any evidence of their existence, it is clearly necessary to rely upon the accumulative heating effect of the currents of small amperage. The device developed for this purpose is known by its descriptive name and is called the heat coil.

153. *Essentials of the heat coil.* The heat coil for the protection of telephone and other circuits from long continued current flow when the amperage is low must possess the following properties:

It must *not* operate when the currents normal to the nature of the circuit are flowing over it.

It must not operate when currents of considerably greater strength than normal are flowing over the circuit for a *short time.* Such a current in a telephone exchange would be the ringing current used for ringing.

It must not interpose a resistance high enough to interfere with the normal operation of the circuit. In telephone exchanges it must not possess self induction, for the telephonic voice currents as well as the ringing currents must pass through it.

It must be cheap, easily removable, easily renewable and compact, and it must indicate clearly by its appearance when it has been operated. When it operates, it must open the circuit toward the apparatus and *ground* the circuit *toward* the trouble in order to operate the ordinary fuse, if possible, and clear the line of further danger and foreign current.

(*To be Continued*)

Newspaper Advertising Brings Good Results.

"Advertising is the keynote of success in modern business," according to a statement made by Charles E. Sumner, president of the San Diego (Cal.) Home Telephone Co. "I've never realized heretofore the actual value of newspaper advertising, until we began to advertise the excellent service and new business policy of the Home Telephone Co., adopted when I succeeded Horace B. Day as president."

As outlined in a previous issue of TELEPHONY, the San Diego Home Telephone Co. recently adopted a policy under which all profits in excess of 3 per cent. per annum on the capital stock would be distributed pro rata among its subscribers.

"Upon adopting this new policy," President Sumner continues, "the Home Telephone Co. began advertising in the San Diego newspapers. The actual result has been the definite increase in the number of 'Homephone' subscribers.

"We are gaining in new subscribers and the public evidently is in sympathy with the Home company under the new policy of operation, as demonstrated by the increasing number of patrons who are installing the 'Homephone.'

"I attribute this gain wholly to advertising in the local papers. I am firmly convinced that every public service corporation ought to advertise its goods and service for sale just as any retail dealer does the goods in his shop or store.

"We propose to continue advertising the 'Homephone' in the San Diego papers, because I am convinced that the more we advertise, the more business we will get."

Agitation for Telephone Merger at Belton, Texas.

The Retail Merchants' Association of Belton, Texas, met recently for the purpose of considering the possible merging of the two telephone exchanges in that city. After thoroughly discussing the proposition they unanimously passed a resolution indorsing a merger of the two companies, and a committee was appointed to confer with the officers of the companies.

July Considerations

Lawsuits—Liability—Reasons—Crops

By J. C. Kelsey

"Father, I have settled the Brown case," exclaimed the excited young lawyer as he dashed into his father's office. But his father dashed his exultation to the ground at once.

"Why did you do it?" he asked. "That case kept your grandfather, paid my way through law school and helped send you through. Don't make such a mistake in the future."

As I write I am in a court room. It is a poor place to write in. It is a noisy place, a location of disagreements, hatreds, tattered emotions, misfortunes and injustices. Above all, it seems to be the original location for contradiction—no one sees things alike.

One witness saw the defendant run north; the other witness saw him run south. The doctor says his skull was fractured; another doctor is equally sure his skull was always fractured. One man says the defendant has character and another says he never got within a mile of it.

And thus we know why courts are so slow. It takes too long to get at the truth. Even then the jury has to guess at it. But the court is immortal; it lives forever and does not have to hurry. It can wait as long for the truth as the contestants, and even longer.

"The Judge is dead, long live the Judge!" No matter whether the Judge lives or dies, the court is there always, grinding slowly on the laborious process of getting the truth out of the human heart.

There was a time when I liked the noise and excitement of a legal battle. It seemed a place where they did things. It seemed as though in court alone were the efforts of men being expended in drying the tears of the down-trodden. Men spoke eloquently. But I have since learned it was because they did not know enough of the case to act otherwise.

I have also learned that the court is only a machine and in the same class with the old Cadillac, single-cylinder automobile. Both will work faithfully, but with much lost motion.

Anyway, four years ago a telephone operator, sitting at a switchboard awaiting a call and holding the answering plug in her hand, suddenly rose and cried for help. A man hurried to her assistance and after making a few futile efforts to release the girl, ran out of the room because he could not see her die.

By and by the girl sank back in her chair, the exciting cause having been removed. Testimony differs as to the time the current was on. Some say two minutes and the victim claims fifteen—it must have seemed hours to her.

The operator has just finished a thrilling story. She has described exactly what you would do if you had a plug in your hand which was vigorously charged by your ringing generator. She writhed, squirmed, twisted and dashed herself about, striking her head and injuring her body. She is either an accomplished actress or has suffered the actual experience. That is for the jury to decide.

The plaintiff alleges that this plug was charged. The defendant claims it was not and could not have been. Both sides will be supported by testimony. Doctors have looked her over and masseurs have told of their efforts. On each side are aligned strong and equally positive forces. Do you wonder, sometimes, that the jury does not have to be sent to the insane asylum after hearing testimony in some electrical cases?

The point is that four years have elapsed since the injury. The case has just entered the circuit court and it will probably start a laborious climb through the state courts, possibly finding its way to the United States Supreme Court.

Only immortals can start on such a pathway. Mortals do not live long enough to see such litigation through. That is why the compensation act has been put into action—it gives the victim a chance to get contracted for justice at once.

Under this act both employer and employe enter into a contract. An employe understands that he is worth so much to the business and no more. A $50,000 business has no right to be called upon to pay $40,000 to a crippled worker. No employe is so valuable that an accident to him should utterly ruin the business.

The law allows $5,000 for the death of a passenger on a train. The average compulsory law takes the same viewpoint that no employe is worth more than that sum. If he differs he does not have to go to work.

The other point is a warning to all telephone men that their business is not without its parasitic conditions. The possible loss due to accident or injury must be taken into consideration. The telephone company must either insure itself or make a reserve out of its earnings for such an occurrence—it is all the same thing. No company that has not provided against accident can pay out every bit of its surplus earnings as dividends.

No manufacturing company can furnish apparatus that will absolutely protect your subscriber or operator. No device is made that will not expand or contract, loosen or tighten, or get out of adjustment. It will do no good to go into court with expensive lawyers and witnesses and try to prove that your devices will not go wrong.

You can't convince a jury that a key with 1/64th of an inch adjustment will not get out of adjustment. You can't convince a jury or any group of men that any mortal agency is infallible. You simply have to admit that you are not infallible and protect yourself against it.

As I sit in court checking testimony and getting ready to dispute the testimony of some young men, honest and sincere, I am thinking how much better it would have been if this girl had been turned over to the insurance company and paid according to contract. However, this accident happened before compensation legislation.

If the case is won, the court costs paid and the lawyers settled with, the operator will have little left—at any rate less than she would have had under a state compensation act.

If an employe is not satisfied with the terms of a compensation act, he is not compelled to take the job. Each occupation has its particular disasters, and past experience almost exactly numbers what the future contains.

Fortunately the telephone business has few terrors. But let us not say that it has none. Let us not say accidents cannot happen and carelessly forget to protect ourselves from loss. Remember this is a public expense and is better collected from the public on the installment plan of a slightly increased rate than in one $10,000 lump.

Recent railway investigation has taught us another lesson. It has been fully demonstrated that the two-cent per mile rate never increased the number of passengers over that carried under the three-cent charge. Possibly there is a small percentage of increase, but the results have proved generally that the cost has increased in a greater ratio.

It teaches Independent telephone men that $2 and $1 rates in a city of 2,000 or more, will not bring a man more telephones than $3 and $2 charges. It is possible that a sudden increase in residence service from $1 to $2 would cause some removals, but the fact remains that $2 and $1 are thankless rates and are not appreciated by the public. A $2 and $1 rate is just as susceptible of attack as a $3 and $2 rate. Telephone men would do well to study the experience of the railways on the question of cheap rates.

Do you know why business is at more or less of a standstill? A startling discovery has been made by a Wall Street financier. You well remember that business was quiet all over the world prior to the war. Almost every nation had its problem of idle men. Construction work of the world had practically decided to wait until the world caught up.

But we have the reason now. Prosperity in America cannot go ahead because of its unpreparedness. It seems that there is a "fear rising from knowledge of our unprepared condition." This fear "unconsciously retards our initiative" in further development of tremendous opportunities.

Are you holding back some orders because a few newspapers have discovered that we have a small army? Are you afraid to add a thousand telephones to your system because Germany has built fifty submarines, which may appear any day in the creek close to your general office? It is a pity that this country is kept in such a distorted frame of mind. And it is all done for political purposes.

The Wall Street financier, as a discoverer of reasons, classes with the man who recently discovered that the shortage in beef and the consequent rise in the price of steak is due to prohibition. Prohibition creeps along and destroys breweries and distilleries. The poor cattle can get no more mash to eat. Now in order to obtain meat at a low price, this discoverer tells us we will have to exalt the whiskey trust in order to produce mash for the cattle.

Prohibition has received another blow—it is accused of killing fish. A West Virginia man says that the dumping of good whiskey in the creeks of the state has had a bad effect on the fish. He makes a pathetic appeal for a change in the law so that fish may be kept sober.

Telephone men are interested in prohibition, especially where they have lost subscribers temporarily. No telephone man has ever complained of a total loss by the abolition of liquor in his town.

Our July meeting brings a message to the banker on your board of directors. The bankers-farmers' conference was held in Chicago last week. It was a meeting to discuss better financial arrangements between soil production and money changing. I thought the lesson applied to the telephone man, especially at a very important point.

When a banker makes a large loan to a farmer, he always demands the name of the farmer's wife on the paper. He will let the farmer have $500 without the least hesitation, however. But if the farmer's wife went into the bank and asked for $150 to buy a good stove, a churn, separator, washing machine, all as important as the new cultivator, the banker would probably have a paralytic stroke.

And if your telephone operators want a calculagraph and some additional apparatus to make you money as well as ease her work, you fall dead, too. Take a leaf out of this little paragraph and improve the operators' conditions. Farmers' wives are not alone in neglect.

Speaking of farming, reports show some wonderful results. Nearly 60,000,000 acres of land were all devoted to wheat last year. The crop will average 16 bushels to the acre, a total of nearly one billion bushels. This makes a wheat farm covering 93,000 square miles, about 3 per cent. of our total area devoted to this great industry.

Corn occupies a space of 173,000 square miles, about two good husky states and only 5 per cent. of the total area. Potatoes occupy 7,000 square miles and the crop will yield 350,000,000 bushels. We have lots of room to grow in.

The telephone business, as far as we are most concerned, depends directly on crops. The number of telephones in New York has no dependency on corn, wheat or potatoes, but it does have on the property of the nearby telephone man who buys telephone apparatus, as he should.

In spite of this, no company has such a cosmopolitan clientele as the Independent telephone manufacturer. He has customers from governments, great corporations, farms in America, ranches in Mexico, settlements in Africa and everywhere the sun shines. The whole world must talk.

Every business contemplates its own death. Each occupation has the fear that it will be obsoleted. The harness maker bowed to the automobile and many trades have succumbed to the change in the manner of existence.

At a recent bankers' conference there was even a fear expressed that the money business was being taken out of private hands. It would seem that the changing of money would always exist. The same eternity seems to be the telephone. The human race will always have the power of speech. There seems to be no substitute visible.

On the whole the telephone business seems to be the child of fortune. True, it has damage suits and some talk that the government will take it over. But on the other hand, the business is close to the soil. It does not depend upon war orders, nor is it affected by ordinary disaster. It is not spectacular, and its speculative days are over. Yet a steady application to the proper building up of a telephone system gives a good financial return.

It is the only business that will fit every location. You cannot build an electric railway in a sparsely settled community, neither could you go into the electric light or gas business. In the telephone business you do not need great capital. A small switchboard and fifty telephones is a good foundation for 50,000 subscribers. It is a business that cannot be covered nor monopolized. It is one which can meet an invading enemy with little or no preparedness. It is a good business.

The moral of this story may apply to another member of your board of directors—the lawyer. We truly have a cosmopolitan business.

MORAL: Keep out of court.

Telephones and the Interned Germans in London.

Germans interned in England use the telephones to converse with one another. Since the mob riots in London all resident Germans have been placed under surveillance. The majority of them are naturalized and in sympathy with the British cause, but for their own safety they have been taken in charge by the authorities. The telephones therefore seem to be the only solace they have. When one of these victims of the war calls up a former neighbor, it seems to be the correct thing not to say "How are you?" but "How is your internment progressing today?" or words to that effect.

Telephone Consolidation in Eastern Kentucky.

N. Starkey, who has been increasing his telephone holdings in eastern Kentucky, on July 10 took over the controlling interest in the Sandy Valley Telephone Co., consolidating this with the Eastern Kentucky Home Telephone Co., Pikeville, of which he is general manager. These companies have been competitors for some time in Pikeville and vicinity.

Australia's Government System Shows Increased Loss

Annual Report for Year Ending June 30, 1914, Presents Interesting Statistics as to Financial Results of Governmental Operation of Telephones—Loss $370,000 More Than in Preceding Year —Conclusion States Telephone Rates Are Too Low

The annual report and balance sheet in regard to the finances of the postmaster general's department of Australia for the year ending June 30, 1914, has been made public. In the report, which was prepared by Chief Accountant C. G. Haldane, attention is directed to a number of changes made in the methods followed in ascertaining costs. It is considered that the amended methods give more equitable results than the methods adopted in 1912-13 as the administration expenses are now localized within sections, and, furthermore, by excluding "administration expenses" from "direct costs" under working expenditure, the heads of the branches concerned are able to ascertain what their branches are costing by way of "direct charges" and "administration expenses" separately.

State.	1912-1913. Loss.	Profit.	1913-1914. Loss.
New South Wales	£124,549	£	£171,568
Victoria	55,644	....	60,384
Queensland	18,985	....	21,729
South Australia (including Northern Territory)	.....	1,955	3,129
Western Australia	13,574	....	29,811
Tasmania	10,958	....	9,801
Totals	£223,712	£1,955	£296,424
Total net loss, 1912-1913			£221,756
Total net loss, 1913-1914			£296,424

Results of Operation of the Australian Telephone System.

The telephone branch of the postoffice in the year 1912-1913 showed a total loss of £221,756. In 1913-1914 a loss of £296,424, a sum nearly double that incurred by the telegraph branch, £151,446, is shown. The loss by divisions of the telephone branch was incurred as follows:

Telephone exchanges	£238,379
Toll lines excluding the Sidney-Melbourne line	64,631

The non-exchange lines and the Sidney-Melbourne toll showed profits which reduced the total loss. The non-exchange lines comprise all classes of lines not connected with an exchange, such as fire, burglar, police, tram, and military lines, but do not include any extension of an exchange service. Tasmania is the only state which recorded a loss on this class. The net profit for 1913-1914 was £3,544, a slight gain over the preceding year, which showed a profit of £3,379. The Sidney-Melbourne toll line produced a net profit of £3,041 as against a profit of £2,787 in 1912-1913.

State.	1912-1913. Loss.	Profit.	1913-1914. Loss.	Profit.
New South Wales	£106,869	£	£152,199	£ ....
Victoria	41,375	....	52,967	....
Queensland	18,245	....	11,170	....
South Australia (including Northern Territory)	.....	5,706	.....	2,912
Western Australia	8,875	....	21,305	....
Tasmania	4,152	....	3,647	....
Totals	£179,517	£5,706	£241,291	£2,912
Total net loss, 1912-1913				£173,811
Total net loss, 1913-1914				£238,379

Results of Operation of Telephone Exchanges.

The accompanying tables show the total results of operation in the various states, and the results as included under exchanges and toll lines for each state.

Where a telephone exchange is situated on the border of two states, and a number of the subscribers are resident in one state, a number being in the other, all of the earnings and expenditures of each exchange have been treated as belonging to the state in which the exchange is situated. In the case of toll lines traversing the border of two states, the earnings for toll line calls accounted for in each state have been treated as the revenue in such state. The expenditures were handled in a similar manner.

One of the tables shows a comparison of the working results of the metropolitan exchange systems in the various states for the year 1913-1914.

The only exchange where the direct working costs exceed the revenue, is that of Sydney, and if administration charges, depreciation, and interest, were added, the gross loss on this exchange would be approximately £137,000. In the report for 1912-1913 it was pointed out that the peculiar configuration of the city of Sydney, and the fact that there were 29 offices in the exchange area, added to the costs of working as compared with other metropolitan exchanges. This explanation was, however, not considered sufficient to account for the excessive costs, and it was stated that a special investigation would be made. The investigation has since been completed and a special report made in the matter. In other metropolitan exchanges the results for 1913-1914, after allowing for administration expenses, confirm the results shown for 1912-1913.

State.	1912-1913. Loss.	1913-1914. Loss.
New South Wales	£18,789	£20,779
Victoria	17,203	10,888
Queensland	1,179	10,923
South Australia (including Northern Territory)	4,716	7,324
Western Australia	5,168	8,613
Tasmania	7,054	6,101
Total	£54,112	£64,631

Operations of Toll Lines, Excluding Sydney-Melbourne Line.

The following comparison shows the approximate net results for all metropolitan exchanges for 1913-1914 after charging administration expenses, depreciation, and interest:

Network.	Profit.	Loss.
Adelaide	£8,000	.....
Sydney	....	£137,000
Melbourne	....	48,000
Brisbane	....	7,000
Perth	....	9,500
Hobart	1,000	.....
Total	£9,000	£201,500
Net Loss		£192,500

The first exchange in Australia to be equipped with an automatic switchboard was the Geelong exchange, Victoria, which was opened for automatic working on July 6, 1912. As was pointed out in the report for 1912-1913, the working results for that year could not be regarded as normal for several special factors caused exceptionally heavy charges

for repairs and renewals to exchange and subscribers' equipment. The expenditure for 1913-1914 seems normal. In order that a comparison with manual working may be seen, the results of Ballarat are shown in the following table:

Name of Exchange.	No. of Subscribers, June 30, 1914.	Capital Value of Plant and Equipment, June 30, 1914.	Working Expenses. Operating and General Expenses.	Repairs and Renewals of Lines and Equipment.	Total.	Revenue.	Surplus.
Geelong	983	£42,160	£ 401	£2,583	£2,984	£6,207	£3,223
Ballarat	965	36,629	1,198	2,053	3,251	6,084	2,833

During the year special inquiries were made into the collection of revenue from public telephones worked on the slot system. The conclusion has been reached that the department is losing revenue by theft from the coin boxes and by omission on the part of operators to insist on the fee of one penny being dropped into the box in every instance. Steps have been taken to make a greater number of surprise inspections and to place a proportion of the public telephones "under observation."

In the conclusion of the report it is stated that a close comparison of the financial results of operations in each branch of the service, viz., postal, telegraph, telephone, and wireless telegraphy, indicates that very considerable economies are possible. A significant statement is:

"The portion of these savings applicable to the telegraph and telephone branches, however, are not sufficient to make these branches self-supporting under the existing scale of charges."

Practical Subjects—Letters and Discussions

Thoughts About Valuation.

Former Interstate Commerce Commissioner Prouty, who is in specific charge of the valuing of the railroads, in an address at the second annual meeting of the Chamber of Commerce of America, in Washington, D. C., in February, 1914, called attention to the fact that, "in attempting to fix the value of the railroads many delicate and difficult questions may be encountered."

In support of this suggestion he cited two concrete illustrations, as follows:

1. In connection with the work that the Government Civil Engineering Corps has to do in the way of resurveying, it has been found that three different grades had to be constructed, each completely independent of its predecessor, in the case of the San Pedro, Los Angeles & Salt Lake Railroad.

This road was built through an arid region. A flood that the engineers did not anticipate, washed away a considerable portion of the first grade, which had been established with ordinary care.

A second grade was then established and constructed with extraordinary care, but it also was washed away by a second and still greater flood. Finally the third and last grade was established.

The delicate and difficult question in this case as cited by Mr. Prouty is:

What recognition, if any, shall be given to the cost of the first and second grades? And, after their obliteration, what shall be done about the impossibility of resurveying them?

2. When the Northern Pacific Railroad was built, Spokane was a small city. The land for terminals cost the railroads practically nothing—having been entirely donated, either by the government or by private benefaction. The Northern Pacific claimed—and it may very well have been true—that the cost of acquiring its right of way through the heart of the city of Spokane, at the time of the hearing, would be at least five million dollars.

Now, to whom belongs this five million dollars? This question of unearned increment presents a difficult problem.

"Illustrations like these two might be indefinitely multiplied," said Mr. Prouty, "but these are sufficient to exhibit the thought I wish to emphasize; viz, that this valuation of our railroads is not a mere engineering problem. Indeed, it is not properly an engineering problem at all, but rather a social and economic problem; a legal problem—in its final analysis a political problem.

One of the leading political economists of this age, when dealing with this same feature of our existing problems, said in the hearing of the writer:

"As a people we must be awakened to the fact that the underlying difficulty is not a matter that can be worked out by civil engineers, mechanical engineers, business engineers, by engineering law suits through our courts, or by engineering new laws through our legislatures. It is not engineering that can be done by our political economists. As a people we must be awakened to the fact that our real difficulty is a problem in ethics."

The Interrogator.

The Proposed Merger at Clarksville, Tenn.

To the Editor:

Following is an article relative to the proposed merger at Clarksville, Tenn. I believe you will agree with me that someone should call the public's attention to the lack of faith displayed by the Bell system since the Kingsbury letter.

SOMETHING ROTTEN IN DENMARK.

On the evening of February 17, last year, Vice-President N. C. Kingsbury of the American Telephone & Telegraph Co., opened a very learned and academic discussion before the Telephone Society of New York on the situation then confronting the business world by these subtly significant remarks:

"A prince in a tragedy once remarked under great mental stress that there was 'something rotten in the state of Denmark.' The plot revealed just what it was."

From developments we are lead to the conclusion that there is something rotten in all of the states of the Union, and that that something is predicated on the lack of faith displayed by the Bell company since its entrance into an agreement with the government on December 19, 1913.

Mr. Kingsbury further stated in the opening of his address: "For several years past we have all been made aware that things were not entirely satisfactory in much larger areas than comprised Denmark. The most important work of this time is that of developing the plot, of finding the cause and applying the remedy."

Mr. Kingsbury's something was of an abstract nature, but the something of which I am talking is in the concrete, and the Bell system has systematically proceeded to develop the plot but has persistently refused to apply a remedy. Mr. Kingsbury's address was delivered just two months after the writing of the letter of December 19, 1913. Throughout the entire address, Mr. Kingsbury attempted to impress one with the skillfully concealed conviction that the Bell system is a philanthropic enterprise. Despite the fact that in one instance he says: "Special interests still exist and I hope always will exist. While I am proud to represent a special interest I am always annoyed when that term is used as one of derision or opprobrium," he immediately launches into a defense of the Bell system by repeatedly claiming that it is not a monopoly.

He says: "Now we are not a monopoly, and furthermore, we do not want to be a monopoly." He claims that the only time that the Bell company ever had a monopoly

was when it gave service for a few hundred feet at the Centennial Exposition in Philadelphia in 1876. He further cites various and sundry statistics prepared by Mr. Gifford, statistician for the American Telephone & Telegraph Co., in all of which he attempted to show that the Bell system is in no sense a monopoly, did not want to be a monopoly, and would never allow itself to become a monopoly.

Throughout the entire address, which seems to have been intended as an explanation of the Kingsbury letter, to the Telephone Society of New York, he attempted to force the conviction that the Bell company would rather sell to than buy out its competitors. He claims that, "in no instance have we gone of our own volition to an Independent company for the purpose of urging it to merge its property with ours or to sell its property to us. I believe it is a fact that we have withdrawn from a larger extent of territory in the last five years than we have entered." He cites an instance, in the abstract, however, as follows:

"Within the last three months the public service commission in another state handed down a mandatory order commanding that the Bell company in that state either buy the exchange of the Independent company at a certain place in the state or sell its exchange to the Independent company. Now we could have done either one under that order. What did we do? Did we gobble up the other exchange? No, we sold our exchange."

Mr. Kingsbury's position with the American Telephone & Telegraph Co. is one of authority and the declaimed intentions of the Bell system as expressed through Mr. Kingsbury, are authoritative. If this were not true, he would never have been the author of the letter of December 19, 1913. It is to be supposed that in dictating that letter, he was expressing the apparent intentions of the Bell system. Certain it is that both President Wilson and Attorney General McReynolds accepted the letter in good faith. This is evidenced by their two letters both bearing the same date as the Kingsbury letter. They read as follows:

"My Dear Mr. Attorney General:

Thank you for letting me see the letter from the American Telephone & Telegraph Co. It is very gratifying that the company should thus volunteer to adjust its business to the conditions of competition.

I gain the impression more and more from week to week that the business men are conforming with the law. It is gratifying indeed to have occasion, as in this instance, to deal with them in complete frankness and to be able to show them that all that we desire is an opportunity to cooperate with them. So long as we are dealt with in this spirit, we can help to build up the business of the country upon sound and permanent lines.

"Cordially and sincerely yours,
(Signed) Woodrow Wilson."

"Mr. N. C. Kingsbury, Vice-President,
American Telephone & Telegraph Co.,
15 Dey Street, New York, N. Y.

Dear Sir: Permit me to acknowledge, with expressions of appreciation, your letter of December 19, outlining the course of action which the telephone companies composing the Bell system obligate themselves to follow in the future.

Your frank negotiations in respect to these matters compel the belief that what you propose will be carried out in good faith; and it seems clear to me that such action on your part will establish conditions under which there will be full opportunity throughout the country for competition in the transmission of intelligence by wire.

May I take this occasion to say that the admininstration earnestly desires to co-operate with and to promote all business conducted in harmony with law; and that, without abating the insistence that the statutes must be obeyed, it will always welcome opportunity to aid in bringing about whatever adjustments are necessary for the re-establishment of lawful conditions without litigation.

Very truly yours,
(Signed) J. C. McReynolds,
Attorney General."

The terms of the second obligatory paragraph of the Kingsbury letter cannot, by even the most simple mind, be misconstrued. In support of the intentions plainly outlined, the fact exists that Mr. Kingsbury in his address of February 17, 1914, states that his letter of December 19, 1913, was a result of much thought and work and produced as a result of painstaking efforts, and that the agreement was achieved after working in complete harmony with the Department of Justice since the sixth day of August, 1912.

This letter could not have been written with any other intentions than that of constituting a proposal on the part of the Bell system, couched in phraseology and composed of terms sufficient to appease the government. Mr. Wilson very plainly shows the view taken of this letter by the government, when he says in his letter, above quoted, "It is very gratifying that the company should thus volunteer to adjust its business to the conditions of competition." And this construction is the one placed upon the Kingsbury letter, at the time it was made public, by all fair-minded men.

Such a belief in the moral integrity of the Bell system seems to have been unfounded. It seems that since entering into this contract, the Bell system has repeatedly broken faith. It has arranged for, or already purchased, the Independent plant at Sanford, Fla. An editorial in the July issue of another telephone publication reviews the Sanford deal and, in general terms, suggests a remedy. It also states that the Sanford plant was recently invoiced at $11,500 and that the Bell people are alleged to have paid $22,000 for it. These figures are easily believable when one remembers the figures on the San Francisco and the Chicago deal.

Down in Tennessee, a like deal is about to be pulled off. In Clarksville, the Home Telephone Co. of Clarksville has been bought, or is being bought by the Bell people. An agreement has been reached and the matter is now before the attorney general of the United States for permission to consummate the merger. Of course, no one outside the immediate circle knows what the figures on this deal are, but when one considers the Nashville situation, he is prone to believe that the Bell company is paying well over 200 per cent. of the actual valuation for what it is getting.

Clarksville is the most southern point reached by the toll lines of the Central Home company of Kentucky and if the Automatic Telephone Co. of Nashville secures its franchise, Clarksville would probably be the first plant connected through Nashville with the splendid Independent toll development throughout the middle and eastern section of the state. Clarksville would also make possible toll connection from all of Tennessee with the Central Home company's development in Kentucky. For this reason the Clarksville Independent plant, for the first time, assumes desirable aspects in the eyes of the Bell people.

The Bell company's purpose in now effecting a merger is most apparent when we consider the fact that the Clarksville plant could probably have been bought much cheaper three or four years ago. It was in a much more rundown condition then than now, and its stockholders were much more discouraged. At that time, however, the Bell company would neither entertain the idea of selling its Clarksville plant, nor of buying the competing plant. It seems, however, that now, in an effort to discredit the Nashville enterprise and to break the chain of Independent toll lines that is certain to ensue from the securing of the Nashville franchise, it is only too glad to "gobble up" the Clarksville plant, and this despite Mr. Kingsbury's assertions in his address of February 17, 1914, and also in direct violation of the terms of the agreement with the government as outlined in the letter of December 19, 1913.

There can be very little, if any, criticism of the owners of the Clarksville plant. In this commercial age, men are few and far between who would refuse to accept two dollars for one dollar, especially when the one dollar is in such condition that it could not be deposited in a savings bank and would not bring in an annual return. Very little blame can be attached to those men who have hung on to the Clarksville proposition so long, apparently fighting a hopeless fight. The Bell company, however, in consummating such a deal, is violating in every sense of the word its agreement with the Department of Justice and prostituting the faith reposed in it by Mr. Wilson and Mr. McReynolds, as representatives of the government. It should not be allowed to consummate any such breach of trust.

Is the Attorney General going to allow the consummation of these unlawful deals? Are the Independent interests going to sit quietly by and see these betrayals of faith take place? Are our Independent associations, by their silence, going to endorse the perpetration of commercial crimes of this nature?

If we, who have interests wholly in common with all Independent telephone plants—interests that are supposed to be protected through the Attorney General by the government—sit idly and allow these unlawful mergers to take place, we are even more culpable than the Bell system and deserve no protection of any kind at the hands of the government or of any other police power in the land.

Nashville, Tenn. R. W. Harrison.

Queries on Theory and Practice

Toll Line Near High Voltage Line.

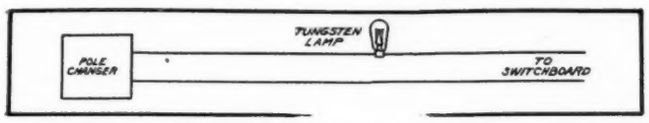
We have a grounded toll line, over 75 miles long, on a private right of way along the Chicago, Milwaukee & St. Paul Railway, which is now being electrified. The company is building a transmission line paralleling, within 20 feet, our toll line for a distance of 50 miles. What we are anxious to know is whether our toll line will give commercial service if it is made full metallic and properly transposed or whether it would be advisable to abandon it. Kindly advise what would be the proper method of reconstructing the line, if it is possible to make a commercial circuit out of it, under the conditions mentioned.

We understand that the Milwaukee railroad transmission line is to carry high voltage alternating current and we fear that it will not be practical to attempt to operate your toll line, even metallic, so close to it. It will be necessary to move it farther away.

Lamp in Series in Pole Changer Circuit.

In a reply to a recent query, it was recommended that a 110-volt, 115-watt, tungsten lamp be inserted in the ringing lead between the pole changer and the switchboard. How is it connected—in series or bridge?

To serve as a protection, the tungsten lamps must be inserted in series between the pole changer and the switchboard, as



Method of Inserting Tungsten Lamp in Pole Changer Circuit.

shown in the sketch, so that all of the current passing from the pole changer to the board will be forced to flow through the lamp.

Phantoming and Transposing.

In Fig. 1-*A* the wires 1 and 2 from Exchange A form a long distance toll line; wires 3 and 4 comprise a farmer's line with 12 telephones at C; wires 5 and 6 likewise are a farmer's line with 10 telephones at D. We propose to install coils at B, making a phantom out of 3 and 4 and 5 and 6, the phantom paralleling 3 and 4 for 2½ miles. Please give us transposition

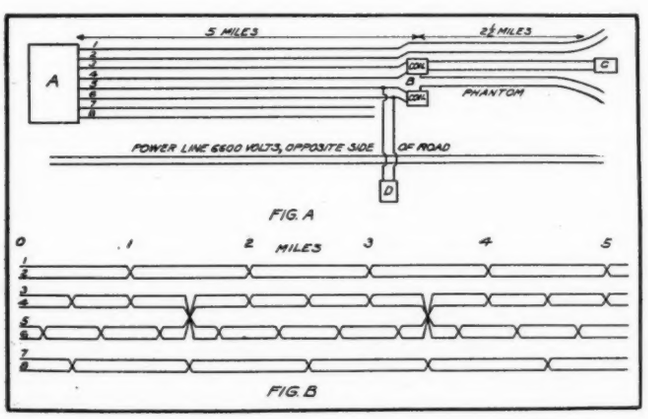


Fig. 1. Proposed Phantom and Suggested Transpositions.

scheme and advise if this phantom will give satisfactory service.

In Fig. 2-A, there are no telephones between A and C exchanges. There are 15 telephones between B and D and 12 on circuit 7-8. Circuit 9 and 10 is metallic to the coil and the remainder is grounded. We propose to cut in two coils at B and make a phantom out of 3 and 4 and 5 and 6. Will this give satisfactory service? How should we transpose?

The phantom plan which you propose for the long distance toll line on the opposite side of the road to the 6,600-volt power line, as shown in Fig. 1-A looks good and will give you good service if carefully installed and maintained. The transposition scheme shown in Fig. 1-*B* can be used.

The same is true of your second plant, Fig. 2-*A*. The trans-

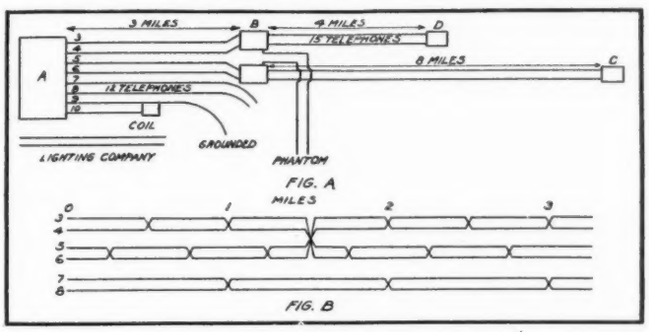


Fig. 2. Another Phantom and Suggested Transpositions.

position scheme shown in Fig. 2-*B* will serve, assuming that the power wires do not parallel your lines far enough and are not powerful enough to require special treatment.

Storage Battery of Automobile.

We have a Maxwell 25, using two six-volt storage batteries for lights and starter. We do not use storage battery in our exchange so have no way of charging them. Can you tell me how I can tell the condition they are in, by a hydrometer and voltammeter?

Your automobile undoubtedly charges the battery automatically while running. This should keep the battery in good condition indefinitely, unless you do too much starting with short runs between. Of course, the water must be kept well up in the battery, to replace evaporation.

If the specific gravity of the electrolyte falls below 1.180 and the voltage below 5.4 volts while the lights are on (engine stopped), it is running too low. Run the engine idle for a while so that with all lights on the voltage is well over 7 volts. Many times a battery is prematurely run down, and even ruined, because the motor is hard to start, due to carburetter adjustment, weak spark, or stiffness in cold weather. The battery used for starting is short lived at best, as the demands on it are exceedingly heavy.

Electrophone Service in London.

The Electrophone Co., under the management of H. S. J. Booth, according to a paper presented before the Telegraph and Telephone Society of London, by D. H. Kennedy, provides facilities for connecting telephone subscribers with Covent Garden, Drury Lane, and practically all the London theaters and halls at which musical performances are given. The apparatus is provided and maintained by the post office telephone department. On Sundays connections are made with the Sunday concerts and also with the services at a number of churches.

For £5 ($24.30) per annum two double headgear receivers are provided, thus allowing two persons to listen together to a performance. For £10 ($48.60) per annum an electrophone table with double receivers for four persons is provided. The company has about 2,000 subscribers in the London district, and it will be seen that the cost per listener is less than 2d. (4 cents) per day. From some individual performers the transmission is especially clear, and when Harry Lauder is at the Palace the lines to that theater are always fully employed. The transmission from the churches is also exceedingly clear, and one can listen, for instance, to the service and sermon at St. James's, Piccadilly, without losing a single word.

Some Applications of Theory to the Telephone Art

Theory and Its Uses—Relations Between Employes, the Public and the Company—The Physical Elements Involved in Telephony—A Paper Presented at the Second Annual Convention of the Independent Telephone Association of America, Minneapolis, Minn.

By Prof. George D. Shepardson

Many people think telephony is very simple—look in the directory for a number, take down the receiver, call the number to the operator, wait a few seconds, talk to the party desired, hang up the receiver, and pay the bill before the fifteenth of the month in order to save the discount—a child can do it, and the simplest can understand it. As a matter of fact, these apparently simple operations involve, directly or indirectly, a large part of human knowledge and experience. The following remarks are intended to show some of the ways in which telephony involves and depends upon various lines of knowledge and experience, which have been so developed and classified as to be expressible in the form of definite laws.

The development and application of the fundamental laws which express the ways in which Nature works in any line of activity may be considered as the theory of that subject. The early stages of development of a theory may be considered as only hypotheses, tentative suppositions, or guesses at the way in which Nature works; but after more extended experience and philosophical analysis, the workings of Nature come to be better understood, and their tentative explanations develop into theories. When properly developed and properly understood, theory should not only explain phenomena which have already been observed, but should also enable one to predict with reasonable assurance what result may be expected when new conditions arise. Theory should also point out the way, more or less distinctly, to the determination not only of the possible ways to secure desired results, but also the best way to reach them.

Theory and practice are usually developed together, sometimes one being further advanced and then the other. To secure the best results, whether in telephony or in any other field, theory and practice should go hand in hand. A hearty welcome should be accorded every addition to knowledge, whether coming through the practical or through the theoretical route, for every addition to knowledge tends to improve our facilities.

Theories may assist in the proper understanding and in the development of telephony in many ways. These may be considered in two general classes, which overlap to some extent, namely, the human and the physical aspects of telephony.

The Human Side of Telephony.

The human side of telephony should be understood both in theory and in application. The laws which govern the mind, those which govern the body, those which govern the relations between people, whether with investors, fellow servants, subscribers, or with the community at large, whether with the individual, the municipality, the commonwealth or the nation—these laws which apply more or less to every business are especially important to the conduct of the telephone business.

In order to handle people most successfully, one should understand the laws which govern the mind. The laws of psychology and of logic have frequent application in the relations between the company and the public, not only in formal reasoning but also and increasingly in cultivating and utilizing subconscious influence and in directing subconscious cerebration.

The laws of mental suggestion, of self-interest and of delegated judgment are involved in the selection and securing of the right kind of local men as stockholders and as officers in the early and late stages of promoting and developing the company. It goes without saying, that the successful manager of a telephone company must be acquainted with the principles and practice of finance and of business management. Either personally or through counsel, he must be familiar with the laws of the municipality, state and nation, at least so far as they may affect his business.

The laws of formal logic and argumentation should be familiar to those representatives of the company who have to do with securing franchises and rights of way. Both logic and subconscious cerebration are sometimes required to secure a right-of-way, or to convince an objecting property owner that trimming his trees so as to avoid interference with wires, will also improve their looks and may even enhance the value of his property.

The laws of salesmanship and the recognition of the psychological moment are as applicable to telephony as to other lines of business. It takes both knowledge and skill to prove to the public that competition in a so-called natural monopoly, such as the telephone business, is of advantage to the community. It takes a knowledge of human nature and more or less finesse, to secure subscribers for the smaller of two competing exchanges.

Recognition should be made of the value of judicious publicity, as means of training the public to recognize the value of the telephone, both in regular service and also in emergency cases. For example, the telegraph sprang into public favor at one bound in England in 1845 as a result of the announcement of how it was instrumental in arresting a murderer who had jumped on a train immediately after committing his crime, but whose description was telegraphed to the stations where the train was to stop. In later times the telephone and the wireless telegraph were looked upon as scientific curiosities, until their usefulness in actual business was established.

Even today, the public needs to be reminded occasionally of the effectiveness of the telephone in times of emergency, as in the sudden checking of the panic in 1907 by the concerted action of the bankers of the country who, between Saturday noon and Monday morning, arranged for simultaneous and universal action in all parts of the United States. The thrilling story of how the loss of life by the Johnstown flood was reduced by prompt use of the telephone has been duplicated several times since, though the publicity was less. The not infrequent instances where help has been summoned by the effective use of the telephone in cases of fire, sudden sickness or fear of burglary, might be used much more effectively, at the psychological moment, by securing wider publicity through the daily and periodical press, if telephone people appreciated more fully the direct and indirect value of impressing upon the public mind the indispensability of this means of communication, and used the occasions to cultivate a more friendly attitude toward the telephone systems and their owners. Incidentally there are suitable occasions to run special advertisements urging people to have telephones in their houses; to have extensions convenient to various parts of

the house; and perhaps to have portable telephones with long cords near the bed for night service or for greater convenience of the sick in summoning attention, in helping pass the tedious hours by conversing with distant friends, or in listening to concerts or other entertainments.

Less directly controllable, but not the less important, is the application of the laws of mind to the relations with and between subscribers. Managers may well study and try to improve what might be called "telephone courtesy," both as between subscribers and as between them and the company. While the imperious call of the telephone bell is recognized as the quickest means of getting the attention of a busy man, the query frequently rises as to whether it is not more of a nuisance than of a convenience. Every effort should be made to minimize its irritativeness.

To be met with the demand "Who is this?", when answering the telephone, is apt to put one on the defense immediately and to induce a subconscious feeling that the telephone itself is partly responsible for the annoyance. Incidentally, the habit of introducing a conversation by demanding the identity of the party responding, may be chargeable to an unduly frequent experience with misunderstood numbers and other false calls.

Next to receiving a false call in the middle of the night, or at other inopportune times, is the not infrequent annoyance from the party who instructs his clerk to "get" a certain party, who is then invited to "Wait a minute, please," while the caller continues to do something else. Such annoyances are partly offset by the facility with which one may cut off a tedious communicant by accidentally signaling the operator to cut off the connection. Slow service, noisy lines and poor instruments may add their quota to the frame of mind of the subscriber toward other communicants and toward the company and the system. The whole relation between subscribers constitutes a problem in psychology and other phases of human nature, worthy of the careful study of managers.

The laws governing the human side of telephony may be applied more effectively in improving the relations between the company and the employes and thereby indirectly with the general public. Employes who cultivate the habit of speaking of "our" company and of "our" practice, or of what "we" are expecting to do, instead of what "they" do, exert a benign influence upon the subconsciousness of the public who are wont to think of corporations as being soulless. The up-to-date operator who courteously answers "Will you excuse us, please?", exerts a very different influence from that of the former operator who insisted that she did not ring a subscriber, somewhat peeved from answering a false call. The complaint clerk and the troubleman should be past masters of the knowledge of human nature and the laws of suggestion. The suave and knowing clerk may assume in each case of dispute, that the customer is right, for indeed he sometimes is.

As it comes to be better understood that one can do the best work, whether mental or physical, when the body is in good condition, more and more employers are undertaking various forms and degrees of so-called welfare work to improve both body and mind of the employe, the investment being returned in higher efficiency. The psychological effect of working amid pleasant surroundings and under comfortable conditions, is found to warrant judicious investment.

Closely allied as a means of improving service, is a study of the attitude of mind of the employe toward the company. The use of the "suggestion box" through which employes are invited to offer suggestions as to the improvement of the service or other matters of interest to the company, is likely to stimulate more intelligent interest, especially when honorable mention, or more substantial consideration, is awarded to those who initiate real betterments. The encouragement of more ready access between employes and the higher officials of the company is likely to have a beneficial psychological effect upon all parties concerned.

The employe who feels that he is a real working unit in the organization, that he is recognized as an intelligent part in a growing and developing co-operative industry, is thereby stimulated to stronger team play. Employes who are enabled to secure ownership of some stock, however small, or who are made participants in the net earnings of the company by some other system of profit sharing, have a stronger incentive to help effect economies in operation and to maintain the service at highest efficiency. In short, a careful and intelligent study of the recognized and the subconscious influences over the minds of the employes, may do much to improve the esprit de corps within the organization.

The telephone field has not secured its proper share of technically trained engineers. This is a result of four principal causes: First, the applications of theory to telephony have not been sufficiently recognized or emphasized.

Second, too many engineering students measure the importance of a field by the size of the units and by the amount of energy involved. They are apt to belittle telephony because many of the operations involve milliwatts instead of kilowatts.

Third, there has been a lack of systematic and satisfactory books on the theory of telephony.

Fourth, most of the manufacturing and operating telephone companies have not sufficiently appreciated the possibilities of improvement by the proper use of suitably trained technical men. Yet there are few fields of electrical development which offer better opportunities for strong men with sound theoretical and practical training, and whose financial leaders better appreciate the value of well trained engineers.

An analysis of the careers of the electrical engineering graduates of one of the technical schools, shows that more than 90 per cent. of those who have entered the telephone field, have been satisfied to persist therein, a larger percentage of stability than that in any other single field of electrical engineering.

The Physical Side of Telephony.

Turning to the physical side of telephony, there has been so much of the "cut and try," and so much of the "copy as closely as one dares" element in the development, that there is a too prevalent idea that telephony is all practice and no theory. It must be confessed that there has been much groping in the dark, and that many of the improvements have been stumbled upon rather than invented. Yet the design, construction, and operation of telephone exchanges, lines and subscribers' sets involve a large part of the fundamental principles of physics, chemistry, mathematics and engineering, and many special applications and developments.

Mentioning first some of the less closely connected sciences: Botany and forestry are involved to some extent in the selection, preparation and preservation of poles, cross arms and pins, as well as in the more carefully finished woods used in switchboards, instruments and in buildings. Zoology or animal biology is involved in the care of the human and the four-footed servants of the industry, and in the destruction or other discouragement of objectionable forms of life which destroy either property or peace and comfort.

The science of chemistry enters the telephone field in several places. The telephone manufacturer is interested in the chemical composition and the possible chemical reactions of paints, lacquers and other preservative coatings for apparatus and other construction. The composition and

performance of insulating material involves more or less of chemical knowledge and of chemical reactions. Chemical corrosion from the use of soldering salts and fluids, may be troublesome to both the manufacturing and the operating branches of the industry.

Electrolysis from foreign currents, and from the much more common local action, is of great importance both in its possible effects on the sheaths of cables and wherever else moisture may come in contact with the telephone circuit. The weathering of wires, insulations and poles is an important chemical effect. The electrolytic rectifiers sometimes used for obtaining direct current from alternating current supply depend upon chemical reactions.

General Knowledge of Chemistry Essential.

Primary cells, both dry cells, such as used with transmitters or bells, and the wet cells sometimes used in small exchanges, are based on chemical laws. Secondary cells, or storage batteries, operate in accordance with known chemical laws, both in their normal operation and also in subsidiary actions, such as the sulphating of the plates and the corrosion from the fumes. The prevention of trouble, especially by electrolysis and in the proper maintenance of secondary cells, calls for a more or less detailed chemical knowledge. While many of these chemical relations act in comparatively simple ways, a full understanding of their direct and indirect effects involves a general knowledge of the laws of chemistry.

The general science of physics includes a number of fields of knowledge, each of which is involved in telephony. Most of the fields of engineering may be considered as developments or extensions of physics, usually of mathematical physics.

The laws of mechanics of materials, and of its engineering extensions, are involved wherever the strength of various parts is important, such as poles, lines, roof structures, and the various parts of moving machinery. They are involved in the operation of relay and annunciator armatures, of spring jacks, ringers, receiver or transmitter diaphragms, time stamps and various other apparatus.

The laws of heat are vitally connected with daily life, in the maintenance of animal heat, in personal clothing, in heating of buildings, in the cooking of food, and less directly in various manufacturing processes, in the development of power, in the various sources of light, and in the manifold uses of the sun. Users of electricity have additional contact with the laws of heat, since a properly regulated current will maintain any desired temperature at any desired place.

Excessive temperature must be guarded against by the proper proportioning of the size of conductors to the current they are liable to carry. Additional safety is secured by proper construction and installation of fittings and other supports. Fuses and heat coils provide additional protection by opening the circuit when the current exceeds safe limits. The heat developed by the current in electrical machinery and other apparatus, is generally what limits the safe output. Heating effects limit the amount of safe current through a telephone transmitter, and thereby limit the distance over which telephone conversation may be conducted.

Moderate degrees of temperature from electrical sources of heat are used in the soldering coppers of the construction and maintenance men in the exchanges. Maintenance of proper temperature of soldering pots and ladles is of importance in cable work. Moderate temperatures are desired, also, in the various electrical cooking utensils which may be found in the welfare rooms or restaurants of the more progressive exchanges. The temperature of the storage battery should be carefully guarded and watched, lest it rise too high, especially during charge; the temperature should not be allowed to fall too low, lest the output be reduced abnormally.

Relatively high temperatures are utilized in the small incandescent lamps used as indicators on the switchboard and in the larger ones used for general illumination. High temperatures are required in the sparks of electrical ignition systems for gas or gasoline engines used for power in exchanges, or for motorcycles and automobiles.

The contraction by cold is an element to be considered in determining the safe tension to be used in stringing wires on pole lines, lest wires strung in summer be subjected to excessive tension in cold weather. The change of resistance with temperature may make considerable variation in the apparent length of outside circuits, and this may introduce complications in determining the location of faults by electrical measurements.

Consideration of these heat effects shows that even a small knowledge of the laws of development and conduction of heat, is helpful to the user of a telephone, while a full appreciation of such laws is desirable to the telephone engineer.

The laws of light have important applications in the use of visible signals and in the illumination of the buildings, especially of the switchboards, shops, and offices. This is of great importance, both for the comfort of the employes, for enhancing the accuracy of work at the switchboard, and for improving both volume and accuracy of work in the offices. Good lighting not only makes better work possible, but its psychological effect induces more interest and higher efficiency.

The laws of sound have important applications in the exchange building, in the performance of telephone apparatus, in the accurate formation of speech sounds by the speaker and their accurate reception and interpretation by the hearer. These laws also have important application in the theory of speech. Questions as to the equivalent pitch or frequency of speech involve the laws both of phonetics and of alternating currents. The shape of mouthpieces and ear pieces, shape and size of cavities, use of soft cushions for ears, proper location of lips with reference to mouthpieces, should be amenable to definite laws. Architectural acoustics is of importance in securing a quiet operating room. It is important in certain special applications of telephony, such as the acousticon for use in auditoriums.

The laws of magnetism, as applying both to permanent magnets and to electromagnets, are important in the construction and operation of telephone receivers, ringers, annunciators, relays, repeaters and other forms of induction coils, generators, motors, and various miscellaneous uses of electromagnets.

The Laws of Electricity Applied to Telephony.

The laws of electricity apply to almost every phase of telephony, being applicable in various degrees from the most simple to the most complex. The laws governing direct currents have important applications in the construction and use of primary and secondary batteries, in the circuits for central energy systems, and in numerous cases in local energy systems.

The laws of alternating currents apply in general to ringing and to talking circuits. They apply particularly to the performance of the receiver, retardation coils, repeating coils, to the use of phantom circuits, to the determination of the equivalent frequency of the telephonic talking currents, to the loading of lines for increasing the limiting distance of speech, to the various uses of condensers and of distributed electrostatic capacity, to the calculation of the equivalent resistance, impedance, or admittance of various electric circuits and to many minor phenomena.

Electrical measurements of various kinds are essential to the proper handling of a telephone system, and are indispensable for many lines of investigation. Each measurement, whether approximate or refined, involves more or less theory, in both the design and construction of the instruments and in their use. For most measurements of current, voltage, and resistance, the ordinary commercial instruments are suitable. Their use requires, however, more or less knowledge of electrical theory.

Some mystery seems to surround the wire chief, who can sit at his desk and, after moving a few switches and watching some instruments, can look at some tables or make a few passes with a slide rule, and then confidently tell the lineman that he will find two circuits crossed between the fifth and sixth pole beyond Podunk corners, and that another circuit is broken about a half mile farther out. Yet such decisions are of daily occurrence, and the lineman is very likely to find the trouble close to the place indicated.

The great obstacle in the way of more definite knowledge of telephony, has been that the speech currents, to which the telephone receiver is sensitive, are so exceedingly small that ordinary measuring instruments are of little if any value. It is not difficult to measure currents between the limits of, say one thousand amperes and one-thousandth of an ampere. But when it comes to telephone current of the order of one-millionth of one ampere, or of one million-millionth part of an ampere, very great difficulty is experienced. The measurement, or even the estimation of such exceedingly small currents involves both a broad knowledge of the theory of electrical measurement and also a high degree of manipulative skill, which can only follow a clear knowledge of the reasons for the various steps.

The various branches of mathematics have frequent applications to telephony. Mathematics is sometimes considered as a method of thinking, or as a kind of logic. It may be considered as a means of expressing thought more tersely than in words and as a short-cut to reaching conclusions. When properly understood and properly used, mathematics is a powerful tool which not only enables one to reach reliable conclusions more quickly and with less effort than by other processes of reasoning, but also enables one to go further and reach conclusions difficult if not impossible to reach by other methods.

An adequate acquaintance with mathematics helps one to analyze a problem into its elements. It helps one determine the limits within which any one of the various elements may be modified advantageously. It enables one to determine the conditions for greatest output or for greatest efficiency, or for greatest economy. Even in cases where one is unable to secure reliable numerical data and is therefore not able to introduce exact numerical quantities into the mathematical expressions, the general effect of the elements may be shown mathematically. Knowledge can hardly be called exact until we are able to say not only "how" and "why," but also "how much." This, almost invariably, involves more or less use of mathematics.

These remarks have aimed to indicate a few of the ways in which theory is applicable to telephony. It is recognized that many of the developments in telephony have been made by men whose only theoretical knowledge came through experience in the "School of Hard Knocks." It may be pointed out, however, that some of the greatest steps in advance have been made possible only as the result of applying the highest technical training and mathematical theory to the problem of telephony. It is difficult to imagine any process of reasoning from so-called "horse-sense," through which one would arrive at the general idea of loading a telephone circuit to make possible longer distance transmission.

It is confidently believed that the large future steps in the improvement of telephony will be made by men who combine both practical experience and theoretical knowledge. There is yet much that we do not know or, perhaps, even suspect. We may look forward to great advances in the future of telephony.

Advertising Toll Service.

Independent telephone companies are rapidly appreciating the value of publicity, as newspaper and other forms of advertising testify. The United Telephone & Telegraph Co., Harrisburg, Pa., is using envelope inserts to boost its toll business. M. W. Smith, the company's auditor, has been using slips approximately 3¼ ins. by 6¼ ins., of which three are shown in the accompanying illustration, in connection with mailing out the toll bills. It is the intention, Mr. Smith states, to follow this advertising matter up from month to month and also to circularize the territory by means of blotters.

A Few of Our Connecting Companies
Keystone Telephone Company of Philadelphia.
Eastern Telephone Company of New Jersey.
Wilmington Automatic Company, Delaware.
Cumberland Valley Telephone Company of Harrisburg.
Consolidated Telephone Company of Reading, Allentown and Wilkesbarre.
York Telephone Company of York.
Columbia Telephone Company of Columbia.
Your Coupon Books are good on any of these lines.
This means 10% saved.
Does This Help Your Pocketbook?
United
Telephone and Telegraph Co.
Familiarity Breeds Contempt
But not familiarity with the Independent Long Distance Rates, as that breeds the habit of saving money.
How?
Our Coupon Books do it for you as does our 5 minute time limit on all calls.
Money Talks
Longer and farther on the Independent Service than you have ever realized. Ask for our Long Distance Points and Rates.
United
Telephone and Telegraph Co.
Safety First
In your expenses helps your earnings.
Independent
Long Distance Toll Rates will save you money regularly.
Our Coupon Books do it for you, as does our five (5) minute time limit on all calls.
Remember
We have both Day and Night Rate. Ask the Toll Operator for rates to the towns with which you do business.
United
Telephone and Telegraph Co.

Advertising Matter of United Telephone & Telegraph Co.

Meeting of Tri-County Association of Ohio.

The Independent telephone companies of Montgomery, Preble and Butler counties held a meeting at Eaton, Ohio, last week for the purpose of discussing matters of mutual interest. Officers and managers to the number of 25 were present and the greater part of the day was taken up with a discussion of the valuation which has been prescribed for telephone companies by the public utilities commission under general order No. 176.

The telephone companies of these counties have formed an association called the Tri-County Independent Telephone Association and hold regular meetings at stated intervals. The association had as its guests H. R. Allensworth, appraisal engineer and M. Rollo R. Stevens, general commercial superintendent of the Ohio State Telephone Co. Members of the association reported that the work of making the appraisal was found to be rather difficult and progress was being made slowly.

The Telephone Directory, a Depository for Valuables.

The telephone book has apparently succeeded the Bible and the well known sock as a depository for the family wealth. As a result the Lakeside Press, publishers of the Chicago telephone directory, is having its troubles.

It took 15 men a whole day to search 20,000 discarded telephone books before an envelope containing valuable papers, several small diamonds, a sapphire, and a diamond studded platinum neckpiece was located. Sixteen men worked nearly as long over 8,350 directories before they came across $40 in cash, $35.42 in checks, and valuable papers left in a book by another subscriber.

Still other searchers looked through 3,500 volumes for $30 which a subscriber said he had deposited in the directory bank.

Proceedings Before Commissions, Courts and Councils

Discussions and Rulings of State Bodies Having Supervision of Telephone Companies, Decisions of Courts in Matters Affecting Public Relations of Utilities and Actions of City Councils Bearing Upon Franchises, Rates and Service

Plan to Devote Summer to Study of Chicago Situation.

Plans to devote the summer months to a thorough investigation of the situation surrounding the Chicago automatic telephone system, which is ordered forfeited to the city in one of three proposals now pending before the gas, oil and electric light committee, were considered when the members of the committee met early this week to determine their course of action.

Attorney Walter L. Fisher, special counsel retained by Mayor Thompson to advise on the proper course to pursue, asked for a comprehensive study of the subject. Attorney Fisher is of the opinion that the city cannot legally forfeit the automatic plant. Many members of the committee agreed with him that the subject was of such great importance and the committee's action would have an effect on the future of the city in dealing with public utilities.

It was suggested that instead of recommending one or another of the three propositions to the council, the members lay out a schedule of meetings to be held during the summer months, while the council members are on a vacation, and by fall have a thorough report ready and a plan of action mapped out.

The three proposals pending before the committee are:

To forfeit the franchise and plant of the automatic company.

To permit the company to sell out to the Chicago Telephone Co.

To continue the automatic system and effect an interchange of service between the automatic and Bell companies.

Opposition to this plan developed at once by the members of the committee who had stood out for forfeiture of the telephone rights and equipment of the Chicago Tunnel Co.

Another meeting was to be held by the committee the latter part of this week, after TELEPHONY had been put to press, at which the financial and business heads of the automatic system, representatives of civic organizations, and several telephone experts were requested to be present.

Hearing in Milwaukee Rate Case.

At last week's hearing in the Milwaukee telephone rate case figures were introduced in evidence showing the rates paid in othr cities. These figures, taken from United States census reports, show that in many cities of similar size, telephone rates are much lower than in Milwaukee.

In many cases these lower rates are given by companies belonging to the Bell system and affiliated with the American Telegraph & Telephone Co., with which the Wisconsin Telephone Co. is associated.

In Milwaukee the rate for unlimited single line business service is $96 a year. In Detroit the Bell company gives a flat business rate for unlimited service of $72 a year. However, one of the experts testifying for the Wisconsin company, stated the Detroit rate is too low and an effort is being made to raise it.

In Chicago, where, according to the Wisconsin company's theory of fixing rates, the charge should be much higher than in Milwaukee, the unlimited business rate of the automatic system is $85.

Minneapolis business men have an unlimited rate of $72 from the Bell concern. The Tri-State company, of Minneapolis, gives a business rate of $48. In St. Louis the business rate is from $60 to $72. There is competition in that city also.

In Cincinnati the service is on a measured basis, and the charge runs from 10 cents a day to $100 a year. The Cleveland rate is $84. Los Angeles, a city in which prices are usually higher than elsewhere, has a telephone rate of $60 for an unlimited service business telephone. Los Angeles, however, has a competing company, which also gives a $60 rate.

It was shown that in the cities where there is a competing company the Bell company in practically every instance gives lower rates than in cities in which there is no competition.

Maryland Rate Case to be Resumed in September.

Not desiring that the lawyers in the case shall be overworked in the dog days, the Maryland Public Service Commission has fixed September 1 as the date by which briefs shall be filed in the Chesapeake & Potomac telephone rate investigation. Argument is to be begun on September 8 and may require three days' hearing.

The commission has completed, after many hours of hearings, the taking of testimony relating to the valuation of the company's property within the state of Maryland. The briefs to be filed and the argument to follow will be based on the testimony taken on this branch of the valuations which include easements. It will be for the commission, after considering the briefs and hearing the arguments, to fix the valuation and the rate of interest the company shall be permitted to earn on its investment.

Not until this question is settled will the commission take up the question of rates, and, as there are many complaints already on file, this branch of the question will doubtless take many weeks.

Demurrer of Commission in Janesville Case Overruled.

In the Dane county circuit court, Judge E. Ray Stevens, on July 10, overruled the demurrer of the Wisconsin Railroad Commission to the complaint in the action of the Rock County Telephone Co. against the commission and E. D. McGowan of Janesville.

Upon the petition of Mr. McGowan the commission ordered a physical connection between the Rock County Telephone Co. and the Wisconsin Telephone Co. at Janesville. The Rock County company appealed to the courts, declaring the order of the commission to be unreasonable and unlawful. The case will now be tried on its merits. The Rock County company objected to the order fixing a five-cent local exchange rate.

Cannot Prohibit Payments by Subsidiary to A. T. & T. Co.

The Wisconsin Railroad Commission has declined to issue an order against the Wisconsin Telephone Co. prohibiting payments to the American Telephone & Telegraph Co. An order to that effect, to hold during the pendency of proceedings in the Milwaukee rate case, was requested by E. H. Hibbard, council for Peter B. Bogart and other citizens who filed a petition against the telephone company to have the commission make an investigation of its rates.

Mr. Hibbard received the following letter from the commission relative to his request for an injunction:

"Your recent letter requesting in substance that this commission enjoin the Wisconsin Telephone Co. from paying out certain moneys for certain purposes until the final decision in the so-called Bogart case is issued, is received and noted.

"In answer to your letter will say that this commission does not seem to have the authority to enjoin or to issue injunctions of any kind. It appears that injunctions can be issued by courts only. In addition to this we are at work on a decision in the Bogart case and expect that it will be out before long."

"It appears from the annual report of the directors of the American Telephone & Telegraph Co., for the year ending December 31, 1914," said Mr. Hibbard, "that the net earnings of the company for the past five years, have been $151,907,007 and this vast amount has been paid in dividends and devoted to surplus and reserves. Toward this sum, the Wisconsin Telephone Co. contributed 4½ per cent. of its gross earnings, and an 8 per cent. dividend upon its capital stock, 99 and a fraction of a per cent. of this stock being owned by the parent company. Since the injunction was demanded, the Wisconsin Telephone Co. has declared and paid to the parent company, its usual quarterly dividend of 2 per cent."

Los Angeles Council Dismisses Rate Suits.

Suits brought by the telephone companies in June, 1914, to annul the rates for telephone service fixed by the Los Angeles, Cal., city council at that time are to be dismissed by the city.

The city attorney will be instructed by the city council to go into the federal court and admit judgment, thus dismissing the suits which were brought to set aside the $5.25 a month rate for business telephones and $2.25 a month rate for residence telephones fixed by the council in June, 1914, for the following 12 months.

It was decided by the council, on the advice of the city attorney, to dismiss the suits, as new rates, which went into effect July 1, for the following 12 months, which are the same as rates previously charged for telephone service, have recently been fixed by the city council.

Proposed Merger at Austin, Texas.

The proposition of the Southwestern Telegraph & Telephone Co. to take over and merge the telephone system of the United Telephone Co. in Austin, Texas, will not be finally acted upon by the city commission for several weeks.

The Southwestern Telegraph & Telephone Co. agrees to erect a modern fireproof telephone building to cost approximately $100,000, to place all of the downtown wires underground, to install new switchboards and other equipment and to make other improvements if the merger is authorized. The company asks, however, that the rate for business telephones be raised from $4 to $5 per month.

The Southwestern Telegraph & Telephone Co. is making extensive improvements to its cable lines in Austin. It now has under construction about 28 blocks or 400 pairs of cable lines.

Project to Consolidate Plants at Temple Abandoned.

The attempt to consolidate the two local telephone exchanges in Temple, Texas, has been abandoned, owing to strong opposition from unexpected quarters. J. B. Earle, of Waco, president of the Texas Telephone Co., has written a letter to Mayor Watters and the city council stating that his company would make no further move toward merging.

The council was averse to favorably indorsing the consolidation and granting a new franchise unless the companies would make certain improvements and give a guarantee against increasing rates in the future.

First Complaint Under New Minnesota Law.

The Minneapolis Civic & Commerce Association is the first to file a complaint with the state railroad and warehouse commission relative to the supervision of telephone companies.

The association suggests to the commission that it requires telephone companies to rescind their recently advanced schedule of toll rates and submit the proposition to the new bureau of telephone supervision.

The commission has the suggestion under advisement.

Oregon Commission Changes Its Name.

Under the date of July 1 the Railroad Commission of Oregon officially changed its name and became the Oregon Public Service Commission, in accordance with legislative enactment. There is no change in the jurisdiction of the commission, which acquired authority over public service corporations by a law approved by the people under the referendum in November, 1912.

Application for Franchise to Install Automatic System.

The Automatic Telephone Co. which is installing a system in Key West, Fla., has made application for franchises in Miami, Fla., and Savannah, Ga. Demonstrations of the apparatus will be made in each place.

Investigation of Mountain States Company Commenced.

Last week work was started on the investigation of the Mountain States Telephone & Telegraph Co. by the Colorado Public Utilities Commission, to justify its rates and schedules. R. G. Gomez, of the Illinois commission, will assist J. R. Rankin, of the Colorado commission, in preparing the data.

Telephone Directories Furnish Fuel for Poor.

Telephone subscribers have often wondered what particular object a telephone company had in collecting the old and obsolete directories. The Sacramento, Cal., exchange of the Pacific Telephone & Telegraph Co., under the direction of Manager H. E. McKee, has founded a little charitable association all its own, wherein the old directories are gathered and stored away until winter sets in and the poor and needy of the city call for fuel and warmth. It is then that the books are distributed where they will do the most good. They are compact and made of a paper which when rolled tight, burns as long and gives as much heat as an ordinary 10 or 12-inch oak stick of equal diameter.

The telephone company revises its books three and four times a year. There are between 12,000 and 13,000 subscribers in Sacramento, meaning that the telephone woodpile contains at least annually about 40,000 "sticks," or enough to furnish 40 poor families with 1,000 sticks of paper fuel annually.

Summary of State Commission Hearings and Rulings.

ARIZONA.

September 15: Hearing in regard to complaints against the rates and charges of the Mountain States Telephone & Telegraph Co. in Tucson, Ariz.

September 22: Hearing in regard to complaints against the rates and charges of the Mountain States Telephone & Telegraph Co. in Flagstaff, Ariz.

CALIFORNIA.

June 17: Application of the Fowler Independent Telephone Co. for permission to increase its rates at Fowler, Cal., dismissed, the company having made a written request on June 15 that the proceeding be dismissed.

July: Order authorizing the transfer of the telephone franchise in Emeryville, Alameda county, from the Bay Cities Home Telephone Co. to the Pacific Telephone & Telegraph Co.

ILLINOIS.

June 13: Hearing in Chicago on petition of citizens of Aledo against the Chicago Telephone Co. relative to a charge of $2 phone Co. for consolidation of the two systems.

July 13: Hearing in Chicago of complaint of J. E. Wells

against the Chicago Telephone Co. relative to a charge of $2 for installation of telephone in the residence of the complainant.

July 15: Hearing on application of the DeKalb County Telephone Co., of Sycamore, for authority to increase telephone charges at DeKalb, Sycamore and Malta.

KANSAS.

July 6: Hearing at Dodge City, Kan., on application of the Cimarron Independent Telephone Co. for permission to adjust rates.

July 13: Hearing at Blue Rapids on complaint of P. C. Young against the Farmers Mutual Telephone Co. for violation of the Kansas public utilities act.

July 23: Hearing in regard to the adjustment of rates of the Langdon Telephone Co.

July 27: Hearing on the application of the Wakeeney Telephone Co. to discontinue connection with the Ellis Telephone Co.

July 27: Hearing in regard to adjustment of rates of the Hays (Kan.) Telephone Co.

MARYLAND.

September 8: Hearing on the investigation into the rates, rules and practices of the Chesapeake & Potomac Telephone Co. in the state of Maryland.

MICHIGAN.

July 7: Hearing on application of the Michigan State Telephone Co. for permission to sell its exchange at Hudson to the Lenawee County Telephone Co. The Bell company has but 29 subscribers at Hudson, while the Independent company has 649.

MINNESOTA.

July 1: Complaint filed by the Minneapolis Civic & Commerce Association, asking that the commission require the telephone companies to rescind their recently advanced toll rates and submit the proposition to the new bureau of telephone supervision.

MISSOURI.

July: The commission has rendered its decision in what is known as the Caruthersville cases, No. 109 and No. 187. The telephone exchange is owned by the Southwestern Telegraph & Telephone Co. The rates as previously charged for service, were as follows: residence, $1.25 per month; business, $1.50 per month. The commission allowed a new rate of $1.50 per month for residence service and $2.50 per month for business service for a period of one year, effective, September 1, 1915. At the expiration of the year, a further re-adjustment of the rates will be made, if at that time it is shown that the rates are either too high or too law. A valuation of $25,000.00 was placed upon the plant for the rate-making purpose.

July 2: Permission granted to Bert McDonald to sell and J. T. Fender to purchase the plant of the Morrisville Telephone Co. at Morrisville, Mo.

July 12: Hearing at Houstonia, Mo., on the complaint of N. G. Smith, against Frank Squire and the Houstonia Telephone Co. The complainant alleged that the long distance toll service was inadequate, and also that some of the minority stockholders were not consulted or allowed to have a voice in the management of the telephone business. Case 690.

July 13: Hearing in the case of C. S. Schafer against the Malta Bend Telephone Co. with reference to service and rates charged for farmer line service, scheduled to have been held at Malta Bend, on this date, has been indefinitely postponed.

NEBRASKA.

July: The commission is investigating a proposal to abolish the telephone toll rate of five cents between Omaha proper and the south side.

NEW YORK.

July 13: The commission dismissed the complaint of Frederick C. Weber of Wales Center, Erie county, against the Federal and Erie-Wyoming telephone companies as to rates and service. It developed on the hearing that Mr. Weber is located just within the boundary of the territory of the Federal company and that he pays a toll charge for calls to the Erie-Wyoming lines, though only a short distance away. It also developed on the hearing that he has been offered the Erie-Wyoming company's service at the same price as the Federal's but that he had refused this and put in a Federal telephone. As he pays the same rates as do other subscribers for a like service the commission finds that the rates are not discriminatory and that he produced no proof that they were unreasonably high.

NORTH DAKOTA.

July 7: Hearing on application of the Griggs County Telephone Co. for permission to increase its rates. Subscribers granted an extension of 30 days within which to gather and present additional data as to why the telephone company should not be permitted to increase its rates.

OHIO.

July 1: Application filed by the receivers of the Central Union Telephone Co. for authority to buy the property of the Tri-County Telephone Co., having about 200 subscribers in rural districts of Stark and Summit counties for $8,476.

September 8: Hearing in regard to the complaint of Wm. A. Shafer asking that the Cincinnati & Suburban Bell Telephone Co. be compelled to connect with the Hamilton (Ohio) Home Telephone Co. for the purpose of giving toll service to Cincinnati.

OKLAHOMA.

July 13 and 14: At a two-day session of the corporation commission hearings were held in the following cases: Leedy Telephone Exchange, of Leedy, vs. Pioneer Telegraph & Telephone Co., asking that the defendant be required to reconnect with lines of complainant; Bills Creek Telephone Co., of Chickasha, vs. Pioneer, Telegraph & Telephone Co., asking for an order to require defendant to connect with plaintiff's line at city limits; Rush Springs Telephone Co., of Alex, vs. Pioneer Telegraph & Telephone Co., asking physical connection and interchange of long distance business; United Telephone Co., of Afton, vs. Pioneer Telegraph & Telephone Co., and Mangum Telephone Co., of Mangum, vs. Pioneer company, for adjustment of division of toll charges. These are test cases in which practically all Independent telephone companies in Oklahoma are vitally interested.

PENNSYLVANIA.

July: The commission has approved the sale of certain poles by the Monongahela Light & Power Co., the Allegheny County Light Co. and the Duquesne Light Co. to the Central District Telephone Co. It has also approved a contract between the Central District Telephone Co. and the borough of Sharsburg for the installation of telephones; a contract between the Central District Telephone Co. and the Petroleum Telephone Co., of Oil City, for the joint use of poles; a contract between the Central District Telephone Co. and the Philadelphia Co., of Pittsburgh, for the purchase of poles in South Buffalo township; a contract between the Central District Telephone Co. and the city of Franklin for the operation of a telephone system; a contract between the Central District Telephone Co. and the district of Allegheny county for the construction of wires on Sandusky street bridge at Pittsburgh; a contract between the Saltillo Telephone Co., the East Broad Top Railroad and the Bell Telephone Co. of Pennsylvania for the joint use of poles in Huntingdon county.

July 1: Complaint filed by the Mastersonville Telephone Co. against the Columbia Telephone Co., of Columbia, Pa., asking for an order restraining the latter from proceeding to erect its lines over and across the lines occupied by the complainant.

July 27: Hearing for general argument on telephone situation in the state.

SOUTH DAKOTA.

July 2: Nebraska Telephone Co. authorized to increase its rates at Hill City, S. D., in return for improvements which have recently been made to the plant.

WASHINGTON.

August 5: Hearing in regard to the question as to whether telephone companies of the state should be allowed to require a $5 deposit from patrons before installing a telephone.

WEST VIRGINIA.

August 17: Hearing at Charleston to discuss telephone service, more especially an interlocking service throughout the state, to which representatives of all the boards of trade and chambers of commerce of the state, together with representatives of the telephone companies of the state have been invited.

WISCONSIN.

July 13: Hearing on the application of the Van Dyne Telephone Co., of Van Dyne, Winnebago county, for permission to increase rates. The rates are now $1.25 per month, of which amount the Wisconsin Telephone Co. receive 25 cents for Oshkosh exchange service. The company desires to charge $16 per year, stating that present revenues are insufficient for a reasonable return on the investment; that the company is in debt twice as much as when the business was started five years ago; that no dividends have been paid to stockholders since the organization; and that there is no sinking fund available upon which to fall back for the work of repair when necessary.

July 14: Hearing on application of the Portage (Wis.) Telephone Co. for permission to decrease its toll rate between Cambria and Portage to 25 cents.

July 21: Adjourned hearing at Bangor on the petition of the Bangor Telephone Co. for an increase in rates from $1 to $1.25 monthly.

Fundamental Principles of the Telephone Business

A Reading Course Designed to Present Logically the Principles Which Underlie Successful Organization and Operation of Telephone Properties—Prepared Under the General Supervision of Stanley R. Edwards—Part I, Telephone Economics, by James H. Shoemaker, Completed June 26, 1915—Part II, The Corporate Telephone Organization, Written by J. C. Kelsey and S. R. Edwards

Quiz Questions on the Preceding Installment.

1. Cite some of the earliest forms of business organization.
2. What was the first type of business organization?
3. What causes lead to trading?
4. State the theory explaining the origin of special trades.
5. What effect did towns have upon trades and trading?
6. State the purposes of early organizations.
7. What efforts were made to restrict production?
8. What was the result of attempts to regulate production?

CHAPTER I. Beginning of Organization (Continued).

9. *The Trend Towards Specialization.*—In life today, we see the man in the limousine and laborer go side by side, and we wonder why there is such a difference in achievement among men. This same difference existed toward the end of the contractor period, for some men were more successful than others.

The successful shops grew in size and the one man in command found it difficult to fight it out single-handed. It requires no imagination to see that processes of manufacturing changed. It required special effort to keep up with even one department. Not only did the processes of manufacturing change greatly but they became correspondingly difficult.

The age of specialization had not yet been born, as it were, but the seed was planted.

10. *Causes Leading up to Partnerships.*—The lone man was forced to surround himself with the various talents or abilities lacking in his makeup. He had to take in a man who could design, one who could execute, one who could sell, and one who could collect the money.

Thus the partnership era came. Men had to exchange their talents and abilities just as Charlemagne's estate had to exchange seeds. The man is rare who is a Napoleon of all things in business. Some men have property or money left them by inheritance, or have money drawn out of a successful enterprise—successful through no fault of their own. Some men have business talent and acumen—everything except the financial necessities. What union can be more logical or fitting than a combination with a man having the talent for using the money successfully?

In early history, the domestic system of organization sufficed. About the year 1000 A. D. the necessity for some interchange of commodities commenced to be apparent. About 1700, the factory system began to take its place in the economic progress of the world. It soon became apparent that one man was unable to handle the increasing complexities of production, hence the device of partnership. After our Civil War, the insufficiency of partnerships was seen, and the corporate form began to be adopted to meet the advanced conditions of our civilization.

11. *Modern Forms of Business Organizations not New.*—The history of organization has been briefly traced and the similarity between business conditions in the ages of long ago with those of modern times indicates business organizations are nothing new, although their forms have undergone changes.

The individual ownership and partnership are, as has been shown, the oldest forms of business organization. They still are common, although both are rapidly giving way to what is termed the corporate form of organization which has been found to be more adaptable to our needs. But even it is nothing new. It has been traced back to the days of Babylon, while the Romans are said to have used a form of corporate organization in their commercial enterprises.

Thus the tests of the ages have been applied to our forms of business organizations. Their good points and their weak points have been discovered with the changes in conditions which are constantly going on. Their forms have been changed but the fundamental structure is still the same.

CHAPTER II. Advantages and Disadvantages of the Various Forms of Business Organizations.

12. *Risks of Partnerships.*—The reasons for the partnership arrangement have been given as being primarily caused by the necessity for securing to business, ability of a certain kind, or money, which the original operator of a business lacked. The causes which lead up to the adoption of the corporate form of organization will be pointed out briefly.

Up to fifty years ago, partnerships were the common practice and a greater part of the time of the courts was taken up in settling disputes which could so easily arise from partnerships. No institution is so susceptible of trouble. One partner is responsible for the acts of the other. A dishonest partner can rob his honest and unsuspecting partner without the injured party having any actual recourse. The man supplying the money may become frightened and refuse to help further; the other has no right to seek needed finance elsewhere unless the partnership be dissolved. The man with the manufacturing or engineering mind may be a sort of a dreamer, and have no conception of the value of the money. Losses due to bad judgment, dishonesty, fear, suspicion, default—all must be borne by the partners to the full extent of their property. If some of the partners have no property, the other partners are liable to the full amount of the loss.

As an individual, or a partner, one must risk not only what he has invested in the business, but all that he has outside of it. Ruin can overwhelm a man suddenly, and through no fault

of his own. An error on the part of one, or a mistake on the part of another, and there is no escape—the full penalty must be borne.

13. *Contracts and Liability of Partners.*—One man can secretly bind his partner to a most disagreeable contract and the latter has to take the consequences, however disastrous they may prove. A contract signed by either partner through haste, mistake, carelessness or even the making of an oral agreement, binds both of them equally. The partners are responsible for the deeds or misdeeds of the clerks. An employe may be injured and an indignant jury might award him judgment for all the partners possess. A stranger may be injured by wires, machinery, a wagon owned by a partnership, or through carelessness and negligence of employes. The partners could easily lose all. If one partner has no money or property and another has, it may all be taken to satisfy claims against the partnership.

14. *The Corporation and Its General Advantages.*—A partnership strengthens a one-man concern. One man found it difficult to keep up, and likewise the partnership failed to keep step with the emergencies and necessities of the times. Out of necessity, the 19th century gave us the corporation.

The corporation has these general advantages: Stockholders may be few or many; there is limited liability of stockholders or owners; and it has perpetual life.

15. *Incorporation as an Advantage for Securing Capital.*—The stock principle enables business to secure capital for a single undertaking of any size. Can we conceive of the United States Steel Corporation with its capital supplied by over 100,000 persons, the Pennsylvania Railroad with over 80,000 persons holding stock and the American Telephone & Telegraph Co. with over 62,000 persons contributing to its capital, as having their capital supplied by any single man or group of men under a partnership arrangement? Assuredly not. Through the corporation, people of small means are enabled to share in the profits of large businesses. As a corollary, it might be pointed out that this is really a move in the direction of public ownership, especially in the cases of railroads and other public utilities. The people thus have returned to them in the form of dividends what may have been taken from them as patrons and the return is much greater than any reductions in rates under governmental ownership and operation.

16. *The Limited Liability of Owners of an Incorporation.*—Each stockholder has a voice in the management of the property in proportion to the stock he holds. He is not liable for the debts of the concern beyond the amount of his investment, except it be in a national bank. In case the business fails, and many do fail, one cannot possibly lose more than he has put in, unless he forgot to pay for all his stock.

To incorporate is to insure one's property against liability. The facility of conducting business is increased. If more capital is needed, the capital stock may be increased and the corresponding shares sold without acquiring any new partners, and especially without acquiring a new partnership agreement.

17. *Ease of Transference of Corporation Ownership.*—The corporation form of organization gives the power of readily transferring one's investment of capital. One partner, in a partnership arrangement, cannot withdraw his capital without consent of the other partners, as a sudden withdrawal might literally ruin the business. A transfer of stock in a corporation has no bearing on the capital in the business, or on the policy of the business. The affairs are conducted by the majority, and it is only when a big stockholder transfers his holdings that a change of policy is likely.

If one wishes to decrease his investment, a few shares of his holdings may be sold without obtaining anyone's consent. Permission from no one is necessary in order to transfer stock to children, wife or other parties. In a partnership, no children of partners can be brought into a business without consent, but that is not required in a corporation.

18. *The Borrowing of Money by Partnerships and Corporations.*—Money may be borrowed with less difficulty by a partnership owing to the unlimited liability of the partners. This feature of limited credit of a corporation, however, is not a serious disadvantage. In the case of a corporation, the stock of which is closely held, notes may be given and signed by the principal stockholders. Stock is deposited as security and there is neither publicity nor technical difficulty. The limited liability feature of incorporation is, of course, surrendered in such a case. If one is a partner, the partner's interest cannot be used as collateral at all. Should it be attempted, the one doing it would fall into contempt of the other partners.

Investment in a corporation doubles the investor's borrowing capacity. If a partnership borrows money, the credit of the individuals interested is just that much depreciated; but the corporation can borrow without at all affecting the personal credit of the individual.

19. *The Perpetual Character of an Incorporation.*—If a business is incorporated, an interest is worth much more, even double, to one's family or estate than if it had remained a partnership. In case of death, partnerships are dissolved. The family gets only the tangible assets. All good will, going value and such items are lost and the surviving partner's life work is practically wasted. In almost every business, good will has considerable value. Incorporation of a business merely removes the risk of losing the family interest in the good will. The stock may be held by the estate for a while and then disposed of at a better figure than would be obtained by the forced closing up of the business due to the dissolution of the partnership.

A corporation lives forever. It is immortal. It has perpetuality. No corporation dies until liquidation takes place. Unlike partnerships, corporate existence gives permanence and stability. It can plan 100 years ahead, and even 999 years. Almost every lease of depots, bridges and railroads run 999 years. Some bonds have been issued which are payable in the year 2350, having nearly 450 years yet to run. Permanent improvements can be made.

Investments can be made by corporations which no partnership would dare to contemplate. They would be impossible because partners die and administrators often have other plans and wish to withdraw. These occurrences usually come at a critical time, when business troubles cause nervous breakdowns, insanity or even suicide. *(To be Continued)*

The Age of Living Steel and Its Relation to Pole Lines

The Depletion of Timber Supply from Standpoint of Pole and Tie-Using Companies—Elements Which Must be Possessed by Steel to be an Acceptable Substitute for Wood—Cushioning at Base of Steel Poles to Give Flexibility

By Edgar S. Bradley

Western telephone, transportation and transmission companies have read the signs—signs as plain as the flaming "Tekel, Tekel, Upharisin," of which gaping Sunday school children are told.

Frantic planting of eucalyptus is in progress—frantic watching for the ten years to pass which are necessary to bring this wonderful tree to its commercial size, is seaming brows of the men responsible for dividend productions. They know—these Western men—the situation transmission and transportation companies are facing. They know that barely half a dozen years will elapse before an absolute quietus will be placed by the government on the further depletion of hardwood forests. Eucalyptus is their only salvation—so far as wood is concerned—for their pole and tie construction.

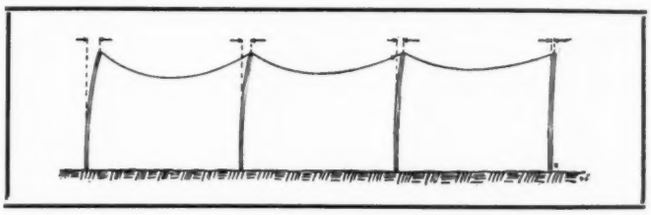
Warnings were issued years ago. Eighteen years since the writer, among others, began filling the columns of syndicate newspapers and periodicals, with graphic articles on the destruction of the country's forests. Western speakers added their force. Western legislatures adopted resolutions commending all these warnings and demanding action by the United States government. Eastern people looked at the pitiable scattering of trees in their Adirondacks, their Alleghenies, their Appalachians and their Berkshires, and smiled in derision at Western pronouncements of a serious menace to the country's commercial development because of wasting the nation's hardwood supply.

During a period of eight years the writer, among others, poured out column after column of matter, illustrating the articles with startling photographs of areas once heavy with forestation, but turned into stump wilderness in two or three years' swinging of the axe. Accustomed to trackless and practically limitless forests, the indifference of the East and of Congress, to Western demands for forest protection impelled the writer to investigate timber conditions in the East. It seemed possible Eastern confidence was justified. A comparison between the gigantic Western forests that were being eliminated with the lilluptian forests of the East that were being proclaimed as the salvation of the country, impressed the investigator only more conclusively with the impotence of the Eastern timber supply to meet the needs of the country.

After these eight years of almost ceaseless battle of Western people, the government did begin an investigation. Results astounded the Eastern officials. Bulletins were forthcoming and only so long ago as two years the Bureau of Forestry made the astounding announcement that the entire hardwood timber supply of the country could last not to exceed 16 years and might continue not more than nine.

Western telephone, transmission and transportation company officials long previously had recognized the peril of a shortage of tie and pole timber. A few scattering sections were planted with cedar and oak. But every hardwood tree known to humans, except one, requires 20 to 100 years to attain commercial size—a thickness of at least 12 inches, six feet above the base. Eucalyptus alone can be brought to marketing stage in less time—ten years being sufficient. But eucalyptus can be grown successfully only in climates where frost does not occur, for if attacked by frost before the tree has acquired an age of two years, the result is fatal to the tree. Consequently the area of planting is limited to some sections of the Pacific Coast and possibly to a few sections in the South.

Favorable locations have been selected by the Santa Fe Railway Co., which is reported to have planted upwards of 10,000 acres, and by the Union Pacific combination of roads.



Dissipation of Strain Along an Earth-Cushioned Pole Line.

Even the city of San Diego is planting yearly, parts of a tract of 1,000 acres, to be insured poles for its municipal trolley lines and other needs.

Under such conditions it is only natural that attention of transmission and transportation companies—the largest users of timber for pole and tie purposes—should be turned to other materials, and the attention, as well, of persons in other vocations who seek either investment, or business opportunity.

Naturally, the one construction material offering itself as a substitute for timber is steel and the writer, like many others, began a study of the use of steel for transmission pole and other purposes.

Instantly arose, the logical conclusion: Steel transmission pole construction must be of a *living* character. Avoidance of breakage, necessity for producing such poles at an economical cost, practical assurance against swaying, uplifts, yieldings to contraction and expansion of wiring—all demanded that steel poles, to be thoroughly efficient, *must be alive.* They must possess more than the mere elements of steel. They must have more than mere tensile strength and more than their mere characteristic resiliency.

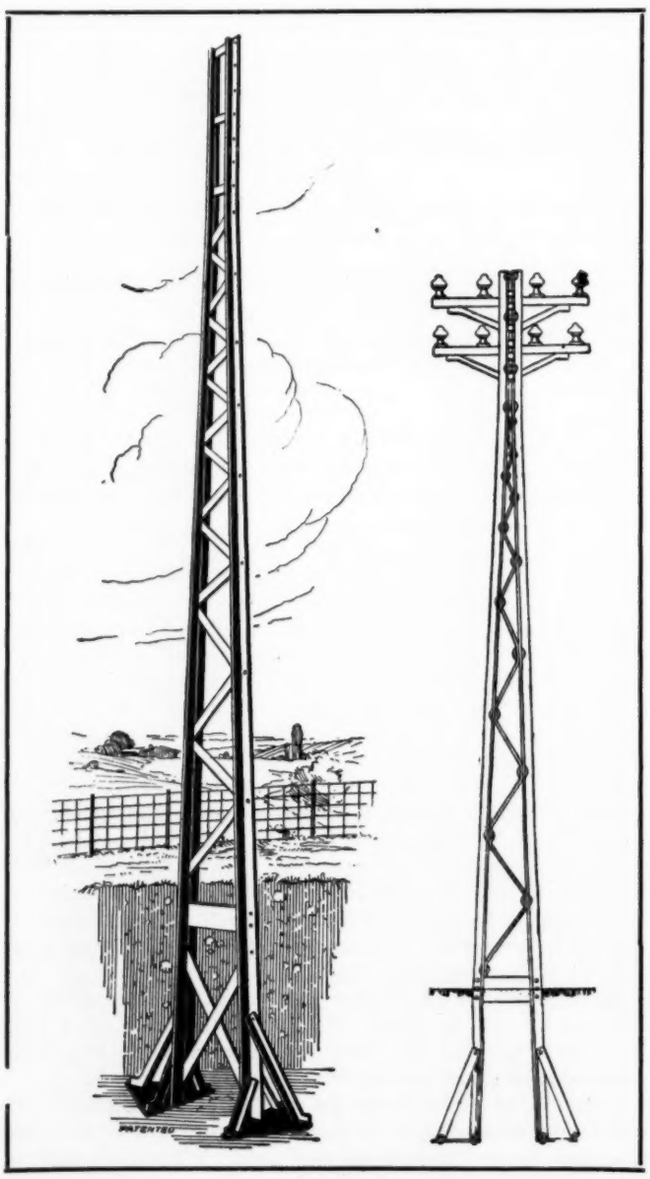
Normal resiliency would prove ineffective, if the pole should be set in a hard substance base at and below the ground line, for a tendency to snap and break at the stiff ground setting would be created. It was recognized that back of the use of steel for such purposes must exist an underlying principle—that Nature herself must have established some relation between the natural resiliency of steel and its supporting base which would permit both the upright pole and its supporting base to work in harmony, so that the normal tendency of the steel to spring back into its correct position after the release of a strain would be fostered, aided and insured by that supporting base.

Concrete or stone bases do not possess the quality of cushioning necessary to produce this united power to resist an attack upon the grounded steel pole. While they possess the merit of weight, their rigidity at the ground level prevents the bending of the steel below the ground line, if the cushioning of the base of the pole that is necessary to prevent breakage, may be called bending.

It became apparent to experimenters and student investigators of what was and is recognized as a serious problem of steel pole construction, that some other form of cushioning the base of steel poles must be adopted to eliminate,

as far as possible, the probability of breakage at the junction of the pole and its stiff base. Only one solution has been found. It is that the steel, which is wrested from Mother Earth, must use the earth and the earth alone as a cushion to counteract the efforts of a straining force above the surface to pull out the pole or break it off at the ground line.

Discovery of this simple solution was followed by action. Experimental tests were made. They were followed by actual installation of poles cushioned in the earth alone, the poles being provided with an ingenious flanging base. This the earth grips and holds in a way to maintain the pole in its intended upright position. The formation of the base is such that it affords a suitably broad surface to prevent any lateral strain on the post above the ground, forcing the base to cut through soft soil. The base is merely sufficiently broad to obtain all the power of resistance against an exterior shock or strain of the earth itself against which the base is cushioned.



Steel Poles Showing Earth Cushioning Principle.

Such a pole solves one of the most urgent of transmission pole problems. And it has been found, in pursuing the efforts of putting an earth-cushioning principle into effect, that many other advantages have been uncovered which unite to make a steel posted transmission line a thing of living steel.

It has been found that wires can be stretched to their utmost tensile strength—that they can be fairly "tuned," as one would tune the strings of a violin. Thus another economy is added to the many producible from an earth-cushioned pole system, for a large mileage of wire can be saved through lack of necessity for allowing so wide a play against contraction from cold or expansion from heat.

The sag of wires between poles is estimated variously at 2 to 5 per cent. of the wire mileage. Thus in a 1,000-mile stretch, the sag uses up 20 miles of each wire attached to the poles at the lowest estimate mentioned, or a total of 200 miles on a 10-wire line of that length.

It has been found, further, that in a system of earth-cushioned poles, the force of any shock or strain is distributed along the entire system until it is dissipated; instead of against any one or two poles—just as when a stone is cast into a lake, the disturbance of the water sends ripples outwards from the center of contact. In consequence, owing to the springy character throughout of an earth-cushioned pole system, the possibility of breakage of any pole from the effects of a storm or other force is lessened vastly, because the ability of the pole to bend and make its fellow poles lend their springy strength to it, compels a distribution of the weight of the shock or strain until that weight dies away in ripples, just as the wavelets of a lake die away.

Such are the more technical terms of description of earth-cushioned poles, which only one company is manufacturing under its exclusive patents. For advertising purposes less technical and more understandable descriptions are used. In plain advertising language the earth-cushioned pole is described somewhat as follows:

A steel pole, consisting of one, two, or four standards (uniped, biped, and multiped), which has its base broadened into flange form in such a manner that when set in a hole, the earth can be tamped into the flanges. This gives the earth the necessary grip to prevent possibility of an uplift through contraction of the wires, or the rise of the wire system from a low-lying ground to a higher level. The broad flanges also set against the undisturbed and naturally hard walls of the pole hole which form a cushioning underground brace for the poles which gives slightly when any shock occurs above the ground line and thus aids the natural resiliency of the steel to prevent breakage. A few inches below the surface, a broad sway plate gives a further brace against shock or strain. As this, also, is cushioned in earth alone, a sufficient rebounding quality is given the pole to aid it in returning to its normal upright position after a shock or strain.

Solution of the problem of cushioning steel poles leads one to the inevitable conclusion that the world has entered upon an age of living steel; that the age of steel, so long exploited in theory, is actually upon us; that it spells opportunity for all persons engaged in the production of steel construction systems which have the earth-cushioning principle as the basis of both construction and installation; and that it means vast economies for transmission and transportation companies, with concomitant increases in dividends through lessened construction and maintenance costs.

One may reasonably expect that the present generation will see practically all railroad and transmission companies' lines equipped with attractive, durable, earth-cushioned steel poles, in place of present uneven, unsightly and always expensively maintained wooden line supports.

Edmonton Telephone Department Shows Deficit.

The city telephone department of Edmonton, Alberta, shows a deficit of $14,400 for the year 1915, of which total $5,202 was added in May.

From Factory and Salesroom

The Scrulix Question Answered.

By Claude L. Matthews.

If the question has been asked once, it has been asked us a thousand times in the last month: "What is a Scrulix?" "What d'yamean Scrulix?" etc.

Well, of course, that's our fault, because we published the name broadcast and failed to tell anybody what it meant. Here's the answer:

Matthews Anchor screws down by means of a helix. Scru=screw and screw=helix, therefore Scrulix is a screw helix.

You see it tells what kind of an anchor it is, if you analyze it, and nobody can copy it because we have copyrighted it in the United States and Canada. But that isn't all by any means.

It means longer life—25 per cent. additional and immediate saving for the user. While they were the most foolproof anchor on the market, now they are more so than ever.

The 25 per cent. additional saving is effected by an average reduction in the prices of the six sizes of 25 per cent.—so you don't have to get out your dynamometer to convince yourself of the truth of this claim. We have always claimed that Matthews guy anchors would save at least 20 per cent. of your anchor—installed—costs.

How did we do it? We bought the patents. This enabled us to have them made in St. Louis where things can be made with very much less expense—fuel and labor—cheaper and better. Thanks to our thousands of customers, our volume also justified the move.

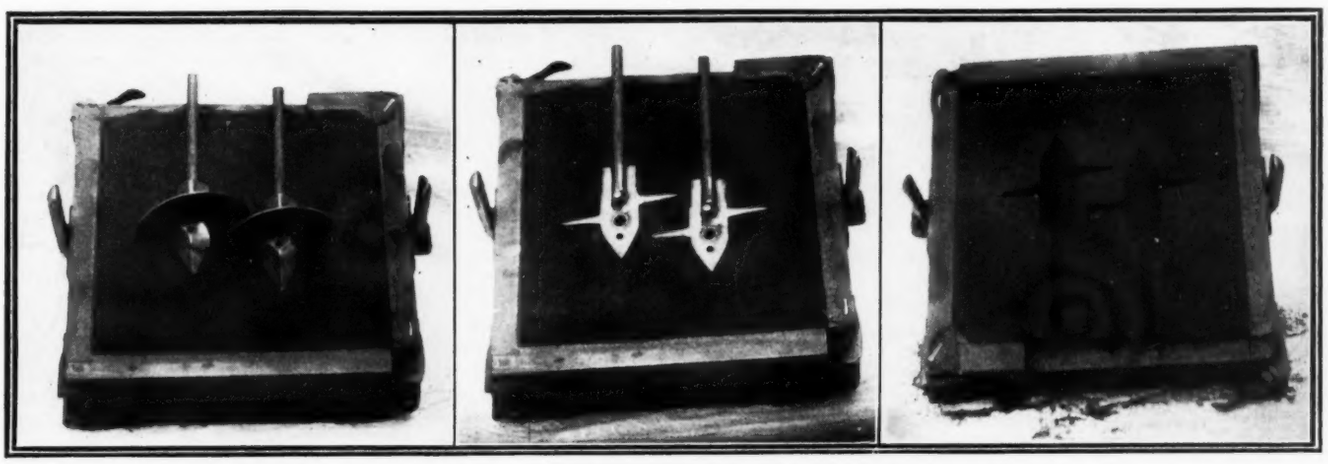
Then we made a ridiculous discovery—ridiculous because no one had thought of it before.

For years we had been casting the helix on the end of the guy rod and then cutting a thread on the other end and placing thereon a malleable iron eye. After we obtained control of the anchor, we naturally began to analyze it to see where it could be improved and if possible, its cost reduced.

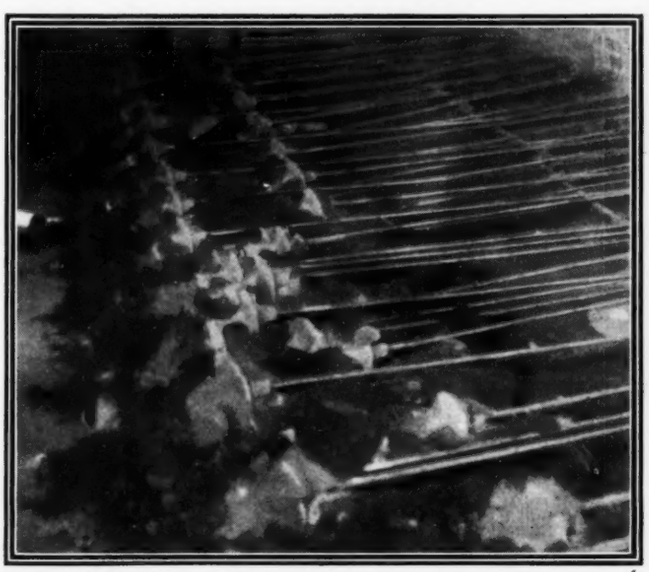
Like a bolt from the blue, it came upon us that of the hundreds of thousands of 5, 6 and 7-inch anchors that had been shipped out in the past ten years, not one eye had let go. That being the case, it would be equally true if the helix were threaded on to the other end. To make doubly sure—instead of using cut threads—rolled threads were adopted and the full strength of the rod conserved.

This discovery made it possible to cast six anchors at a time instead of two and, of course, reduced the cost very much indeed and greatly improved the quality of the castings.

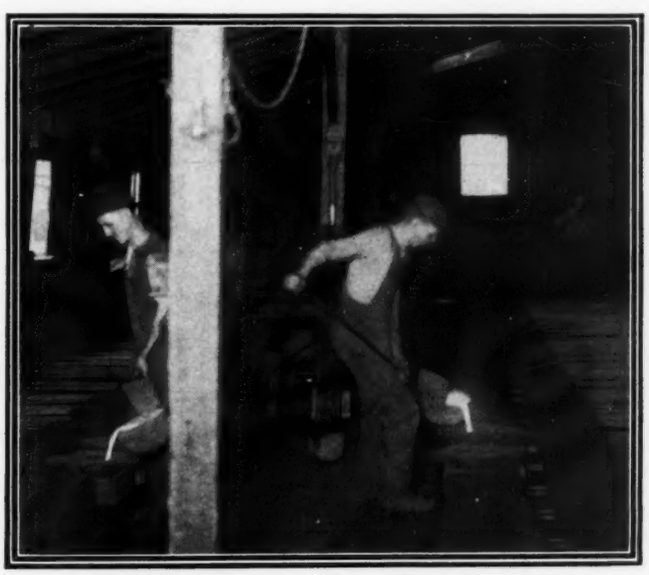
Before all of this took place, an exclusive agreement had



Old Method of Making Screw Anchors, the Rods Being Cast R ight on Anchor—Only Two Anchors Cast in One Flask.



Anchors After Mold Is Broken, Using the Old Method.



Pouring a Heat by the Old Method.

been made with the manufacturers of Armco iron, for the right to sell pole line hardware made of it.

To those who don't know—Armco iron is guaranteed to be 99.84 pure iron.

Pure iron resists rust while steel invites it. There is so little difference in the tensile strength of iron and steel rods that the A. T. & T. specifications call for either iron or steel of the same cross section.

Exhaustive tests and the testimony of hundreds of railway and highway engineers all over the United States, based on 10 years' experience in the use of Armco iron for culverts, show that it is practically free from rust, while steel culverts of the same gauge, under the same conditions, rust out in from six months on.

The 5, 6 and 7-inch Matthews Scrulix anchors will be equipped with Matthews Armco rods and will be guaranteed as follows:

ABSOLUTE LIFE GUARANTEE.

W. N. Matthews & Brother, Inc., of St. Louis, absolutely guarantee the 5, 6 and 7-inch Matthews Scrulix anchors to outlast any other anchors using galvanized steel rods of the same cross section and they guarantee the 8, 10 and 12-inch Matthews Scrulix anchors with square rods, to outlast the same round sections galvanized.

W. N. Matthews — President. Chas. L. Matthews — Secretary.

The 8, 10 and 12-inch Matthews Scrulix anchors will be made the same as heretofore, except that the name "Scrulix" and the size will be cast on the helix.

The rods of the 8, 10 and 12-inch Matthews anchors have always been 1⅛ ins., 1¼ ins. and 1½ ins. square. They are made of very mild steel—low in carbon. By making the cross-section square, we obtain 13 per cent. more resistance to twisting than is the case with the same section in round unthreaded rods made from the same bar. This avoids the necessity for using high carbon steel, which is exceedingly subject to corrosion in the ground, even if galvanized, and which must be used to resist the twisting strain placed upon them as they are being screwed down.

Our early test, made years ago, made us believe that it wasn't safe to furnish anchors that had to be screwed down in dry weather (without the aid of a wrench) with round high carbon rods of less than one inch in diameter with a maximum helix diameter of six inches. So we went to square mild steel rods and made the cross-section great enough to withstand the twist even in hard, dry ground. This was before we knew anything about the experiments of Dr. Cushman and other metallurgical engineers on the reasons for corrosion in iron and steel.

It is for these reasons that we feel perfectly safe in putting in our guarantee these words: "and they guarantee the 8, 10 and 12-inch Matthews Scrulix anchors with square rods, to outlast the same round sections galvanized."

On each of the 5, 6 and 7-inch eyes is cast the size and the words: "Matthews Scrulix Anchor."

Here is a minor improvement that has considerable value: There is no excuse for the jobber to ship you a 6-inch anchor when you order a 5-inch, or a 7-inch instead of a 6-inch; or for your storekeeper to make the same mistake either in receiving them or in delivering them to the construction gangs on requisitions.

Formerly all the eyes were exactly alike on all three sizes and the only way to tell the difference was to look at the size of the rod or helix.

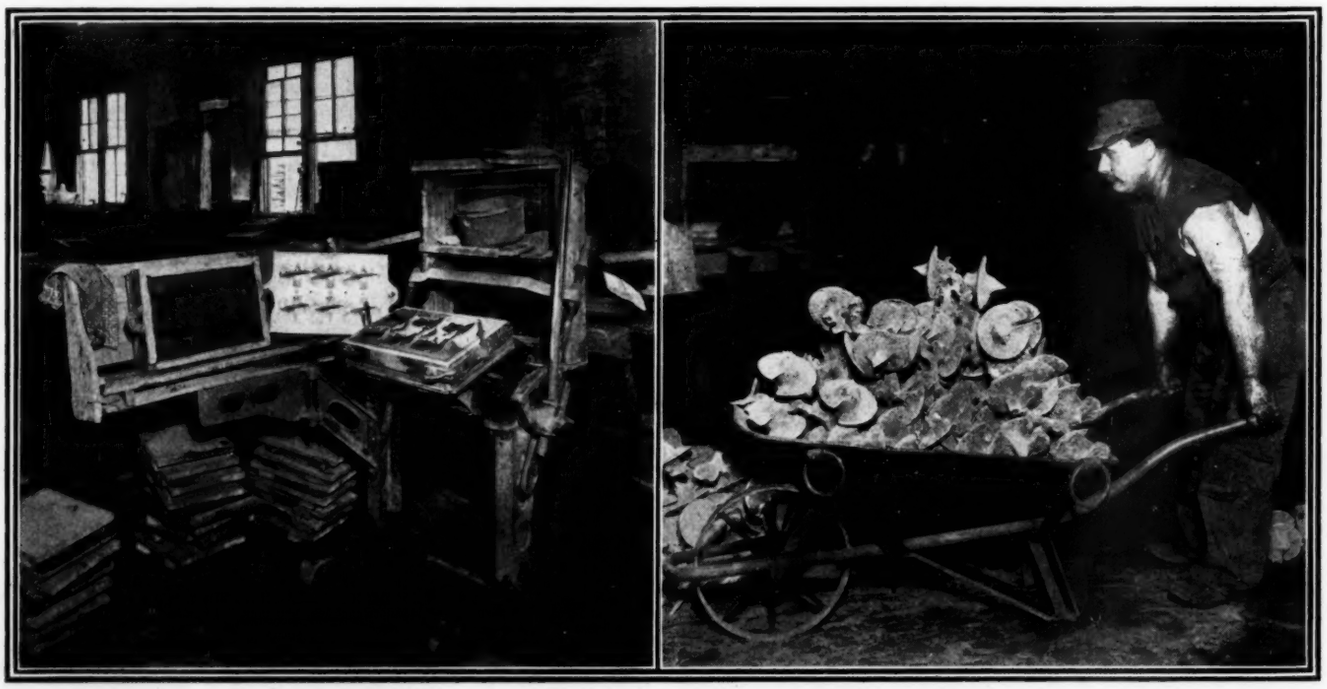
Another advantage possessed by these eyes, is that your inspectors can more easily tell at a glance what size anchor has been screwed down and a permanent record is there.

The eyes of Matthews Scrulix anchors are made of the best quality malleable iron and then galvanized so that they will last as long as the ungalvanized Matthews Armco rods to which they are attached. The galvanizing is done by a special process that does not affect the annealing.

Matthews Scrulix anchors will be ready for the market July 25, 1915. After that date the 5, 6 and 7-inch Matthews anchors without the word "Scrulix" on the helix and the eyes, will be hard to get.

Nearly all electrical supply jobbers in the United States will either have a stock of them or a stock shipment on the way to them on July 25, 1915.

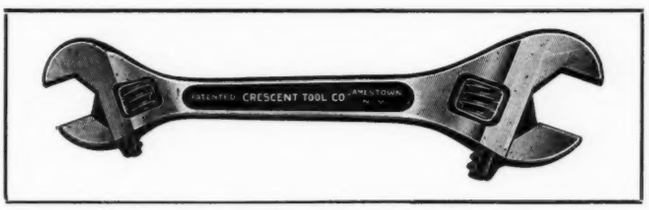
The improvements and savings about which you have been advised in this article, are the result of 15 years' experience and the collaboration of the most expert minds on guy anchors in the country today.



New Method of Casting the Screw Part Separate from the Anchor Rod—Six Anchors Cast in One Mold—The Result.

New Crescent Double-End Adjustable Wrench.

The handy double-end adjustable wrench shown in the accompanying illustration, was recently placed on the market by the Crescent Tool Co., of Jamestown, N. Y. Telephone men using automobiles or motor trucks in connection with their trouble and repair work will find



The Crescent Double-End Wrench.

this new tool particularly useful. It is made in two sizes, a 6-8 in. size and a 8-10 in. size. The smaller wrench weighs 11 ounces and the larger 16 ounces. Because of the double-end feature the tool has all the advantages of a 6 in. and an 8 in. wrench, with considerable less weight, the double-end wrench weighing but one ounce more than the largest size single-end wrench. That is, a 6-8 in. double-end wrench weighs only one ounce more than an 8 in. single-end wrench and the 8-10 in. weighs only one ounce more than the 10 in. single-end wrench.

By having the two ends of the wrench turned the same way, the back of each head makes a perfect handle, by means of which the other end of the wrench may be operated without discomfort.

Garford Company Is Enjoying Good Business.

Although July and August are usually looked upon as being rather quiet months in the telephone, as well as other lines of business, the Garford Mfg. Co., of Elyria, reports a steadily increasing demand for both its magneto and common battery equipment.

Among other business the following orders were recently placed with the Garford company: Boone County Telephone Co., Harrison, Ark., 600-line common battery multiple switchboard; Fowler Telephone Co., Pella, Iowa, 400-line common battery multiple switchboard; United Telephone & Telegraph Co., Lock Haven, Pa., 400-line common battery multiple switchboard; Mutual Telephone Co., Erie, Pa., 500-line common battery multiple addition.

The last named order is the fourth addition supplied to the company at Erie within the past three years. The Garford Mfg. Co., through its distributing houses at Kansas City, Seattle, Los Angeles and Sumter, is prepared to make quick deliveries to any part of the country. The company states that it is enjoying a splendid business from each of these points.

New Device for Holding a Telephone Circuit.

"The Telhorn holds the line while you're busy." This is how a new device recently placed on the market in London is being advertised by its manufacturers. TELEPHONY's London correspondent has witnessed a demonstration of this holder. It is designed to hold the line while inquiries are being made or while a person is being called.

Messrs. Shannon, of London, manufacturers of the Telhorn, claim the instrument is taking very well. Its usefulness is unquestioned. When a person telephoning has secured his number and wants important information, or desires to speak to some particular person, he is often kept waiting with the reply: "Hold the line, I will find him," or "Wait a minute, I will look it up?" Sometimes it is annoying and in the meantime the person's work is at a standstill. With the Telhorn the receiver is placed upon it and the calling subscriber can go about his work until he hears the call: "Hello!" or "Are you there?" He then knows the person he wants is ready to talk over the telephone and he picks up the receiver.

According to its manufacturers a patent for the Telhorn has been granted in the United States but the marketing has not yet been arranged for.

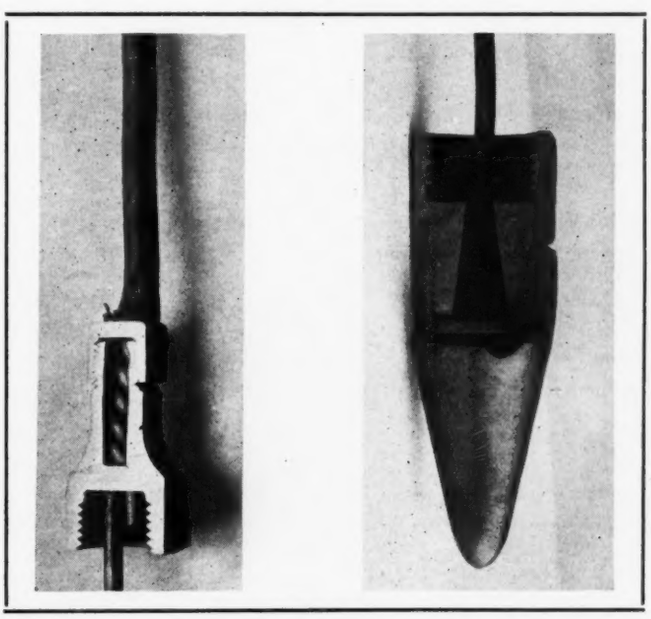
Fargo Cable Clamps and Grounding Devices.

The Fargo Mfg. Co., of Poughkeepsie, N. Y., manufactures a number of devices for use on wire, cable and strand. Some of these devices are of special interest to telephone men. The F. N. C. cable grip shown in one of the illustrations is adapted for use on guy wires. The compression principle is applied to this grip. To apply the grip, the end of the guy wire is pushed through the connection. It is then wrapped around the pole or run through the ring or eye of the anchor, or other device to which the guy or strand is to be attached. It is then passed back through the connection and the set screws tightened. Among the advantages claimed for this grip are its long life, the elimination of any undue bending or cutting of the strand and also the facility with which slack may be taken up.

The Fargo Steel Cable Grip.

Another device is that known as the straight connector in which the compression principle is also used. The type A connections can be used not only for conductors but also on guy wires, span wires, etc., as they will take wires from No. 14 B. & S. gage up. Another adaptation of the Fargo connection device is its use in connection with making grounds.

In the accompanying illustrations are shown the devices adapted for use with iron pipe for making grounds. The ground point may be attached to pipe having a diameter of from one-half inch to one inch. The ground connection is adapted for pipe in diameters from one-half inch to one and a quarter inches. With the use of these grounding devices the wires are locked together, affording a bond of high con-



The Fargo Grounding Connection and Ground Point.

ductivity and it is stated that there is no danger of the contacts becoming loose or broken. It is also pointed out that considerable time is saved in installation as the devices are most easy to install.

Specializes in Telephone Appraisal Work.

O. Morsman will be remembered by many of TELEPHONY's readers as one of the earliest construction engineers in the Independent telephone field. His construction experience extends over twenty years, during which time he has engineered some of the most modern telephone exchanges in the United States.

O. Morsman.

For some time Mr. Morsman traveled through different parts of the United States for the Kellogg Switchboard & Supply Co., of Chicago, and later for the Dean Electric Co., of Elyria, now the Garford Mfg. Co., as special sales engineer.

Way back in the early days of Independent telephony, he installed some of the first switchboards marketed by Independent manufacturers.

For the last three years Mr. Morsman has specialized in telephone appraisals, having appeared before several commissions. This experience together with his wide knowledge of telephone materials and construction makes him well fitted to appear before railroad or public utility commissions in connection with appraisal work for rate-making purposes, amalgamations, etc.

Sterling & Son Co. to Establish Headquarters in Bay City.

The W. C. Sterling & Son Co., of Monroe, Mich., dealers in cedar poles, posts, ties, etc., has decided to make Bay City its main distributing point and establish its headquarters there. For this purpose a portion of property on the west side of the city has been purchased. The site has a river frontage of 260 feet and runs back from the river to the Michigan Central right of way, a distance of 1,000 feet. Work will be begun at once on the rebuilding of the docks and dredging out two slips adjoining the property.

The small yard which the company has maintained on the eastern side of Bay City will be discontinued. In its new location, the W. C. Sterling & Son Co. will be afforded adequate facilities for shipping both by rail and by water.

Paragraphs.

THE NUNGESSER CARBON & BATTERY CO., Cleveland, Ohio, with reference to the increased price of batteries, is sending out a card to its customers calling attention to the fact that the dealer who sells the battery makes less and the Nungesser company also makes less than it did at the old prices but that company is giving just as good a battery as prior to the increase in the cost of raw materials. The circular ends with the following quotation: "So let's grin and bear it together. It's better to be soaked here than in a trench."

LOUIS M. PIGNOLET, of New York City, has been awarded a bronze medal for portable electric measuring instruments by the international jury of awards at the Panama-Pacific International Exposition.

W. N. MATTHEWS & BROTHER, St. Louis, Mo., call attention to the fact that owing to the unprecedented condition of the spelter market, many have inquired as to whether they intended to advance their prices on Matthews giant and baby boltless guy clamps and Matthews two-bolt guy clamps. Fortunately, before the price of spelter began to rise, W. N. Matthews & Brother purchased a large quantity of spelter and are therefore able to ship boltless and two-bolt guy clamps at the old prices.

British Telephone Business Reported Good.

An idea of the volume of telephone business in Great Britain during war times is gained from the report of the Peel-Conner Telephone Works, Ltd., which shows a net profit for the year ending March 31, of £107,712 ($523,540). Of this total £25,000 ($121,500) has been placed in reserve for depreciation and £20,000 ($97,200) for general reserve. Dividends paid last November absorbed £12,500 ($60,750).

The company states that last year the flow of contracts was irregular and that the prospects for the present year are excellent. This would seem to show that there is nothing wrong with the telephone business despite the general business upheaval of war time.

New Manufacturing Concern in Edinburgh.

Edinburgh, Scotland, is to have a new telephone manufacturing concern to be known as the Loudon Telephone Co., Ltd. The company is chartered to make, sell, erect, maintain and work private telephones, electrical or otherwise. Its capitalization is placed at £50,000 ($243,000). The shares are sold at £5 ($24.30) each.

Cumberland Statement Shows Loss for First Quarter.

According to a statement filed with Secretary James Galceran, of the Mississippi Railroad Commission, the Cumberland Telephone & Telegraph Co. has lost heavily in that state for the first three months of 1915.

The report shows that the total revenue from Mississippi business amounted to $350,789. The expenses including taxes and depreciation in property were $385,673. This represents a loss of $34,884. The average book value of the plant in the state is $5,482,828.

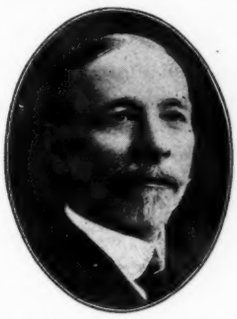
This report is for the first three months of this year when the war scare and "hard times howl" was at its height. Things have since picked up and are fast rounding themselves back into normal condition and the report for the second period will no doubt show a great improvement.

Annual Report of South American Company.

The gross earnings of the United River Plate Telephone Co., Ltd., of Buenos Aires, Argentine Republic, S. A., for 1914 were £630,652 ($3,064,969) and maintenance and other charges, £468,846 ($2,278,592). After paying the dividend on the preferred stock and the dividend on the common stock, there remains £103,206 ($501,581), plus £6,357 ($20,895) brought forward. £2,000 ($9,720) are to be put to the staff provident fund, £20,000 ($97,200) to reserve, and a dividend of 5 per cent. paid on the common stock, making 8 per cent. for the year, leaving £6,563 ($31,896) to be carried forward.

New Feature of Chicago Telephone Directory.

A new feature of the directory of the Chicago Telephone Co., the June issue of which was recently distributed, is a line in bold type at the top of the front and back covers, which reads: "Police, Main 13—Emergency Calls—Fire, Main 0." The prominent display of this line is part of a publicity campaign conducted by the police and fire departments, co-operating with the telephone company, to familiarize telephone subscribers and the general public with the police and fire emergency telephone numbers.



Philip Nungesser

War Pushes Up Prices of Dry Batteries

Owing to the increase in the cost of raw materials and the difficulty of securing them because of the war in Europe it has become necessary for manufacturers of dry cells to raise prices.

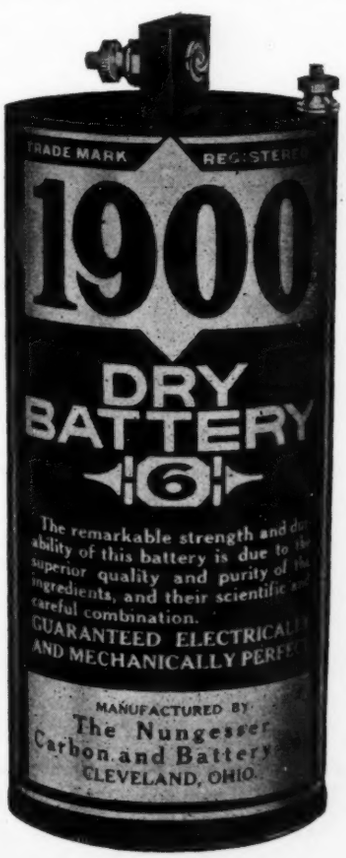
The increase in prices constitutes one more reason why users of dry batteries should make sure when they are buying dry cells that they are getting those which will give the most uniform service and last longest.

The 1900 is Most Economical Because of Its Long Life

When he produced the 1900 Dry Cell, Philip Nungesser, the man who made the dry battery a commercial success, had two prime objects in mind.

One was to construct a battery that would give an excellent uniform current, such as is required for Telephone Service, and the other was to secure unequalled lasting qualities.

Both of these objects were achieved in this Battery. It generates a strong, steady, current; it has extraordinary recuperative powers, and its long life makes it the most economical battery, especially for use in Telephone Exchanges.



The use of the 1900 Dry Cells will make it possible to keep down your battery expenses in spite of the rise in prices which has been made necessary because the war has shut off the importation of raw materials. Ask your jobber for 1900 Dry Cells. They are used in exchanges throughout the country. Get the economy they insure through unexcelled uniform service and greatest powers of recuperation and endurance.

Write us if your jobber cannot fill your order.

NUNGESSER CARBON AND BATTERY COMPANY

Cleveland, Ohio

Condensed News Reports

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items of Interest as to Their Plants and Systems

Personal.

J. M. CECIL, of Omaha, Neb., has been appointed manager of the Horton, Kan., exchange of the Northeast Kansas Telephone Co.

K. W. JOHNSON of the traffic department of the Central Union Telephone Co. has taken a similar position with The Ohio State Telephone Co., effective July 12.

CHARLES H. WILSON, who for 15 years has been general superintendent of the American Telephone & Telegraph Co., has been appointed to the newly-created position of general manager.

FRANK HUDSON has resigned his position as local manager of the Northeast Kansas Telephone Co., at Highland, Kan. Corban Lucas, of the Home Telephone & Electric Co., of Highland, will succeed him.

H. G. WELLS, formerly manager of the Bridgeport exchange of the Nebraska Telephone Co., has been placed in charge of the Central City exchange, succeeding A. D. Connor, who resigned about a month ago.

C. M. KELLEY, for three years local manager of the Niagara County Telephone Co., at Niagara Falls, has been advanced to the position of assistant to W. H. Seely, superintendent of operation, with headquarters in Buffalo, N. Y.

CHARLES LARIMER recently succeeded J. H. Leppert as manager of the Ebensburg, Pa., exchange of the Bell Telephone Co. of Pennsylvania. Mr. Leppert has been transferred to the company's Johnstown exchange.

New Companies and Incorporations.

ELKADER, IA.—The Motor Telephone Co. has been incorporated. The officers are Michael Bente, president; A. C. Storbeck, secretary; and Geo. Tieden, treasurer.

SCHALLER, IA.—The Schaller Telephone Co. is being incorporated with a capital stock of $20,000.

LOST CREEK, KY.—The Lost Creek Telephone Co. has been organized here with G. E. Drushal, President, Solomon Noble, Vice-President and G. W. Deaton Secretary-Treasurer and Manager.

FULTON, MO.—The Mississippi Central Telephone Co. has been incorporated with a capital stock of $40,000. M. Bell, B. S. Read, and J. P. Crowley are among the incorporators.

BIRCHDALE, MINN.—The Border Co-operative Telephone Co. has been incorporated with a capital stock of $5,000. The officers are Gunder Nybo, president; Einer Anderson, vice-president; F. D. Ball, secretary, and Albert S. Chonsby, treasurer.

LARK, N. D.—The Brisbane-Lark Farmer's Telephone Co. has been incorporated with a capital stock of $3,000. The incorporators are W. T. Roberts, F. A. Wagner, and A. L. Drew.

MILLWAY, PA.—The Millway Rural Telephone Co., a limited partnership, has filed its papers in the recorder's office. Amos B. Oberholtzer is president; John Wolf, secretary; and Lyman Withers, treasurer.

YOUNGSVILLE, PA.—The Youngsville Telephone Co. has been incorporated with a capital stock of $5,000. The incorporators are D. W. Mead, E. L. Coover, R. H. McDowell, H. H. Hull and A. E. Cole.

CUSTER, S. D.—The Custer County Telephone Co. has been incorporated with a capital stock of $25,000. The incorporators are F. N. Sutherland, Arthur Montgomery, and Martin Long of Custer; and Peter Zeimet of Pringle.

AUBURN, TENN. (R. F. D. from Woodbury.)—The Auburn Home Telephone Co., with $1,000 capital has been incorporated by H. H. Kennedy, C. R. Robinson, J. D. Odum and others.

CELINA, TENN.—The Union Telephone Co. has been incorporated with a capital stock of $1,000. The incorporators are J. B. Walker, Sam Keisling and W. J. Maynard.

Construction.

LEPANTO, ARK.—The Lepanto Electric Light & Telephone Co. expects to rebuild and enlarge its plant in October.

WILMINGTON, DEL.—The Diamond State Telephone Co. has appropriated $12,000 for alterations and additions to its central office.

INDIANAPOLIS, IND.—Plans have been completed for a new exchange for the Central Union Telephone Company at Central avenue and Fortieth street, to cost approximately $20,000. The contract will be let at once.

CENTERVILLE, IA.—The Appanoose County Telephone Co. is building a new and up-to-date office.

LOST CREEK, KY.—The Lost Creek Telephone Co. will build a system between Jackson and Hazard.

LINCOLN, NEB.—The Lincoln Telephone & Telegraph Co. will commence changing its country lines to ten party with full metalic circuit.

MOORESVILLE, N. C.—The Mooresville Telephone Co. will install a lot of new cable in the residence district of their city.

MILWAUKEE, WIS.—The Wisconsin Telephone Co. has appropriated $11,000 to be used for repairs for the Eau Claire district.

JOHNSON CITY, TENN.—Wm. H. Bostwick solicits pieces on telephone equipment for a $40,000 hotel.

JUJUY, ARGENTINA.—A new company which has just acquired the generating station here, intends to reconstruct and extend the telephone network in this province.

Elections.

OPSTEAD, MINN.—The Eastside Telephone Co. has elected the following officers: E. E. Barhite, president; N. B. Berg, vice-president; and Algot Williams, secretary and treasurer.

CLEARFIELD, PA.—The following officers were elected at the annual meeting of the Huntingdon & Clearfield Telephone Company, at its recent annual election: W. H. Denlinger, of Patton; T. J. Lee, Philipsburg; A. W. Lee, Clearfield; John Wrigley, Clearfield; H. J. Patton, Philadelphia; treasurer and manager; J. H. Allport, Barnesboro; Howard B. Hartwick, Clearfield, secretary.

MARSHFIELD, WIS.—The directors of the Marshfield Rural Telephone Co. have elected Otto Veers, president; E. E. Butters, vice-president; John Brinkman, secretary; and H. G. Hambright, treasurer.

Financial.

NEW HAVEN, CONN.—The stockholders of the Southern New England Telephone Co. have voted to increase their capital stock from $10,000,000 to $20,000,000.

MONROE, WIS.—The directors of the United Telephone Co. have declared the usual 3½ per cent. semi-annual dividend, payable August 1.

Miscellaneous.

SPICELAND, IND.—Albert R. Martmer, Warren M. Knaff, and Frank P. Lyons, of Flora, Ind., have purchased the entire capital stock of the Spiceland Co-operative Telephone Co., which operates exchanges in Spiceland, and Dunreith, Henry county, and Mays, Rush county. Mr. Knaff is president of the company under its new ownership; Mr. Lyons is vice-president, and Mr. Martmer, secretary, treasurer and general manager. Until recently Mr. Martmer was manager of the Flora Telephone Co., having been in charge of this plant for about eight years. He will move to Spiceland and take charge of the property at once.

WINNIPEG, CANADA.—Houston & Co., Ltd., electrical wholesalers and sales agents would be pleased to receive catalogs and discounts from manufacturing firms.

SEVILLE, SPAIN.—The American Consul states that for some time there has been an agitation on foot for the extension of telephone lines to the various towns and villages surrounding Seville. The interurban company which contemplates the proposed extensions is Compania Peninsular de Telefonos Interurbanos. 25, Celle Tetuan, Seville. All correspondence should be in Spanish.

WHITESBURG, KY.—The Whitesburg Telephone Co. is negotiating for the purchase of The Citizen's Telephone Co.'s lines in this county, and the Knott County Telephone Co.'s lines into Hindman. If the purchase is made these lines will be consolidated into the Whitesburg Telephone Co.